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Numbering Trains.

ELMIRA, N. Y., Dec. 11, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Nov. 13, page 806, you refer to the changing of numbers of eastbound through trains on the Lake Shore & Michigan Southern, that they might be numbered in the order of their departure, and from the "Traveller's Guide" for December this appears to have been done, although no numbers of westbound trains have been changed.

When, in 1854, the New York Central & Hudson River, Boston & Albany, Michigan Central, Lake Shore & Michigan Southern and Cleveland, Columbus, Cincinnati & Indianapolis (now C., C., C. & St. Louis) adopted a system of uniform numbers for through or connecting trains the advantages of the plan were plainly evident, not only to the officers of passenger departments of various railroads interested, but to the employés of the roads affected and the traveling public generally; and the latter more and more every year learn to identify a train by its number, except, of course, on lines where numbers are shifted around with each new time table. The writer has in mind a trunk line whose employés time table for many years indicated trains by number only, and as these numbers were permanently applied to trains, every man, woman and child along the road would inquire at telegraph or ticket office, when interested, "How's train 12?" "Is 3 on time?" etc., and were not puzzled or confused as on some roads by a "Way Mail," which carries no mail; a "Boston Express," which runs to New York and only connects for Boston *without* a through car, or a "Pacific Express," which, without running to or connecting for any Pacific point, pulls up at every way station on the line. These instances are not inventions or exaggerations; they may have been seen only a few years since, all of them, and some of this christening still exists.

Of course, for advertising purposes, the "Clipper," the "Peacock Green Flyer," "Cannon Ball Flyer," etc., must be run, and yet not all of the exaggerated expressions of passenger men are in good taste. The "Empire State Express" of the Central is an example of an appropriate and distinctive name. A train carrying passengers may be classed properly as an "express," if stopping at few stations; "way" if stopping at all stations, or "accommodation" when the train is a freight carrying passengers for their accommodation. What kind of a train is a "Way Express," that has been advertised?

The Michigan Central has not changed any numbers; its 12 now is 24 on the N. Y. C. & H. R., leaving Buffalo later than Central 12, but as 24 on the latter road is a new train; possibly the M. C. people were not advised of the new connection. As the New York Central & Hudson River has made no corresponding changes of numbers, a passenger on the L. S. & M. S., destined east of Buffalo, starting on 4 finds himself on 14, or starting on 6 completes his trip on 16; he may take 8 and on passing on to the Central line, lo! he is on 6. Suppose he finds the "New York Limited" No. 12 a convenient train, after leaving Buffalo he is on 4 without having left his comfortable seat. Should he prefer to take 14 he arrives on 8, or taking 16 comes in on 12, and all this on roads under allied managements.

The New York, Lake Erie & Western, Pennsylvania, Baltimore & Ohio roads for years have adhered closely to the practice of applying one number to a continuous or connecting train over their own and controlled lines. Is it not a step backward to abandon such custom?

Undoubtedly the Lake Shore people know their own business, but the inquiring mind asks, "Why is it necessary, or even important, for trains to be numbered in order of their departure from terminal?" "May not every change of time table affect such numbering, and if you lose continuous numbers, what do you gain?"

Detention and Diversion of Cars.

AMERICUS, Ga., Dec. 2, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

One of the most vital questions of the hour in railroad circles is how to get cars promptly returned by our connections, and what methods are most efficacious to prevent the wholesale diversion of foreign cars, practiced more or less by all roads, especially in the West and South. This question has been discussed from nearly every standpoint, but no unanimous conclusion has ever been arrived at, and like freight car couplings, we each have an invention of our own, and some companies, regardless of the opinion of the masses, have tried to put their ideas to a practical test, yet very few can see in what way the evil has been mitigated.

Were all roads to double their equipment, thereby causing a superabundance of cars, the evil would be lessened, but not eradicated. This proposition, however, is of course untenable, but few roads being able to make such an outlay at once, nor would they be justified, for the cost of new equipment, in most instances, would be far more than the loss sustained by several years of delays and diversions. The per diem idea is a good one in some respects, yet there are some objectionable features, which have rendered it unpopular in the minds of our managers. Every plan of per diem suggested so far has been entirely too complicated and costly. The adoption of the per diem system could not do away with our present mileage record, for we must have the mileage on which to base our cost of operation, and very few companies would care to keep both records. Being fully aware of the fact, that most companies desire to spend as little as possible upon their car record office, a simple idea has suggested itself, which may not by any means be original, but is here produced with the hope that it may at least throw a spark of light upon a perplexing subject.

Suppose we continue our present system of car records, reporting as customary the mileage earned by connections each month, and enforce *rigidly* the taking of receipts at junction points. Then in addition to this allow our connections only a certain length of time in which to return our own, as well as foreign cars delivered them, *to whose return we are entitled*, and for each day held over the specified time charge and collect a fixed amount. A graduated scale of charges could easily be determined on, based upon the number of miles each car is to be hauled in order to reach its point of destination. As an example, suppose we allow our connection three days in which to return a car that is to run from one to fifty miles after leaving our rails; four days in which to return after running over 50 and not over 100 miles, and so on, up into the thousands, charging 25 cents for each day delayed over the specified time.

If *unanimously* adopted by all roads, would it not cause prompt returns and prevent diversions? I am satisfied that it would insure prompt reports of all cars destroyed in wrecks and force all damaged cars to be promptly repaired. All roads would, of course, be obliged to have and enforce demurrage rules, which would indeed be a blessing. Cars now stand loaded for weeks, even months, simply because it is not convenient for consignees to unload. I believe also, that much car tracing would be done away with, and on many roads lost car agents would be recollections of the past, though I have nothing against these genial gentlemen.

Now, as to the cost, which we all agree is the most important feature of all. I believe the practice suggested could be put into effect and carried out without one cent of additional cost. All roads of any importance now keep a record of cars received and delivered at junction points, either in their agents or yard master's office. These points could be furnished with this scale of charges, and the agents of the different roads could settle daily for all cars delayed beyond the specified time, in like manner as they now settle on most lines charges on through freight. Of course in making up this table of charges Sundays and legal holidays would have to be allowed for.

Some may claim that cars are not always returned by connections to points from which they were originally received. This is very true, and ninety-nine times in a hundred the fact that a connection desires to return a car to us at a different junction point, clearly demonstrates the fact that the car has been diverted by them and they are simply trying to complete the injury by saving mileage which they would otherwise have to pay were the car hauled back to point first received.

I know to advocate such a simple measure is suicidal in the eyes of some "red tapists," and I, indeed, wish I had more space to deal with this subject in every phase. The question has been carefully studied in detail, based upon years of experience in both the Car Record Office and Transportation Department.

E. T. B. GLENN.

New York Central & Hudson River Railroad Co.,
NEW YORK, Dec. 12, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE :
I have read with interest the letter from Mr. E. T. B. Glenn on the subject of Detention and Diversion of Cars. At the present time, when the subject of car supply is filling the thoughts of all in the transportation department of the various roads, any suggestion looking

toward the prompt handling and return of foreign cars is to be welcomed.

Mr. Glenn has objected to the per diem plan as being too complicated and costly, yet apparently is endeavoring to get the benefits of "per diem" by spreading out the increased expense at junction stations rather than by concentrating it in the Car Record Office. Were his plan to be adopted, in my judgment, he would find a very considerable increase of expense necessary at junction points where the interchange exceeded say one hundred cars per day. If such a plan were in force to-day at Buffalo the increase in the clerical force necessary of any one of the trunk lines at that point alone would be fully equal to all the additional expense that would be required in the Car Record Office if the original per diem plan were put into effect.

I would also suggest that very many cars are delivered at junction points that the agent would naturally expect to be received at such point, but which a reference to the junction records shows should be declined. As an example, Western cars at Albany are constantly being declined from the New England roads, which went into New England either by the Northern or Southern routes.

Very many gentlemen in discussing this problem are possessed of the idea that the combined mileage and per diem plan, as suggested by the American Railway Association, would be too complicated and costly. The experience of those who actually worked under this plan was that the increase in expense was but very small to those roads who already had a proper Car Record Office and mileage department.

If the matter of economy in the Car Service Office is alone to be considered, "straight" per diem would be the cheapest, as the accounts under that plan would be simple and would do away with the present mileage computation altogether; but having in mind the equities in the case and due economy, I am still of the opinion that the only true plan that has as yet been presented is the combined mileage and per diem system, making the rate say one-half cent a mile and ten cents per day. If these rates were unanimously adopted by all roads it would without doubt cause prompt returns and prevent diversions of foreign cars.

The car service rules in effect at so many points throughout the country have been of the greatest benefit in regard to the prompt handling of equipment. The experience of the roads working under these rules during the past two years has been most satisfactory; so much so that it is very rare now to find any loaded cars standing any undue length of time waiting to be unloaded at any point in the State of New York. But we still need some means to expedite the return of cars from foreign roads, and for that I know of nothing that has as yet been suggested so satisfactory as a mixed per diem and mileage system.

THEODORE VOORHIES.

PITTSBURGH, Dec. 11, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read Mr. Glenn's proposed plan carefully, and if I understand it it embraces:

1. That each agent at a connection should take receipts from the foreign road for all cars delivered to it.

2. These receipts will have to show the *destination*, otherwise it will be impossible to apply the graduated scale.

3. The agents of the different roads will settle daily (d) for all cars detained beyond the specified time.

Mr. Glenn offers this as an alternative plan for per diem, which he thinks is "too complicated and costly."

It seems to me that a mere statement of the scheme, as above, shows that it is not so simple and inexpensive after all. The additional work of taking receipts may not seem much at small stations, although even at them it is an additional straw on the backs of men already often overworked by the number of reports they have to make, each of which "costs so little." But at the larger terminals, while I doubt if it will be practical to get the receipts at all, I am quite sure prompt requisitions will come from the agents at them for additional help. To this we must further add the increased work in either the Car Record or Auditor's offices in checking the agent's report to see that he has made the correct charge on the connecting line. These considerations would seem so effectually to disallow the claim for cheapness that it is not worth while to enter into other details of the scheme which seem to me equally impractical. In comparison with straight per diem I have no hesitation in saying that Mr. Glenn's plan will be found much more "complicated," "cumbersome" and "costly." It is quite true that the adoption of straight per diem will not do away with the calculation of mileage, but it is too often overlooked that it would very much simplify it, inasmuch as the calculations now made for the purpose of settling with foreign roads would no longer be necessary. The mileage calculated on which to "base the cost of operation" does not require the division of the cars according to ownership, but only the total of each train divided into loaded and empty. The saving in clerk hire effected by this simplification would, in my opinion, more than compensate for the labor of counting the days of *foreign* cars on any line, so that I should not be at all surprised to find that straight per diem would be found less costly in clerk hire than the present system.

EDMUND YARDLEY.

EDMUND YARDLEY.

Chutes for Coaling Locomotives.

The coal chute illustrated this week is not new, but it has been improved and bettered in its details, and it now embodies some features in addition to those of its original design. We illustrate the form of pocket which has been most recently built. The change in this chute from the older methods in taking off the weight of the apron by a counterweight, whose vertical resultant shall vary the same as that of the weight of the apron, was a marked advance from the dead weights formerly used. The apron and arms are built of oak,

1½ in. pawl, bent out 5 in. at the inner end, and held to a 2 in. flat strap by a split key, the flat being held to the door frame with bolts. The retaining door latch is offset 3 in., and, by means of a notch at the forward end, engages with the flat strip. A guide for this pawl is provided, which is made up of four pieces, pivoted together and fastened back by the short end pieces to the frame.

The sides of the apron are shod with 2 in. x 1 in. x ¼ in. channel iron, which is also used for stiffening between the sides and bottom, with several 24-in. strips bent at right angles at the middle.

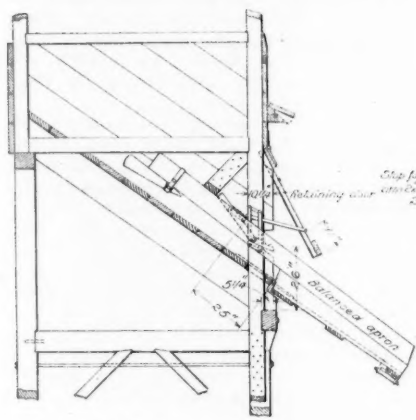


Fig. 1.
View showing location of irons.

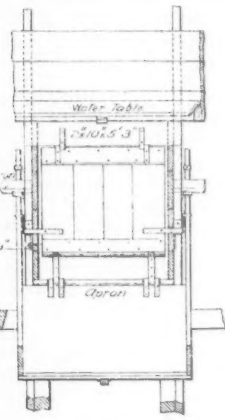


Fig. 2.
Front view showing apron down and gate open.

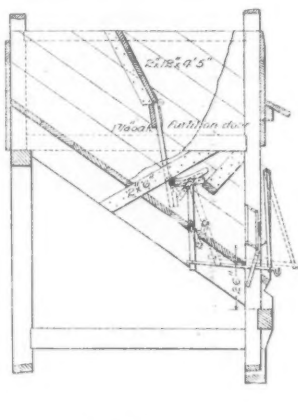


Fig. 3.
Double pocket.

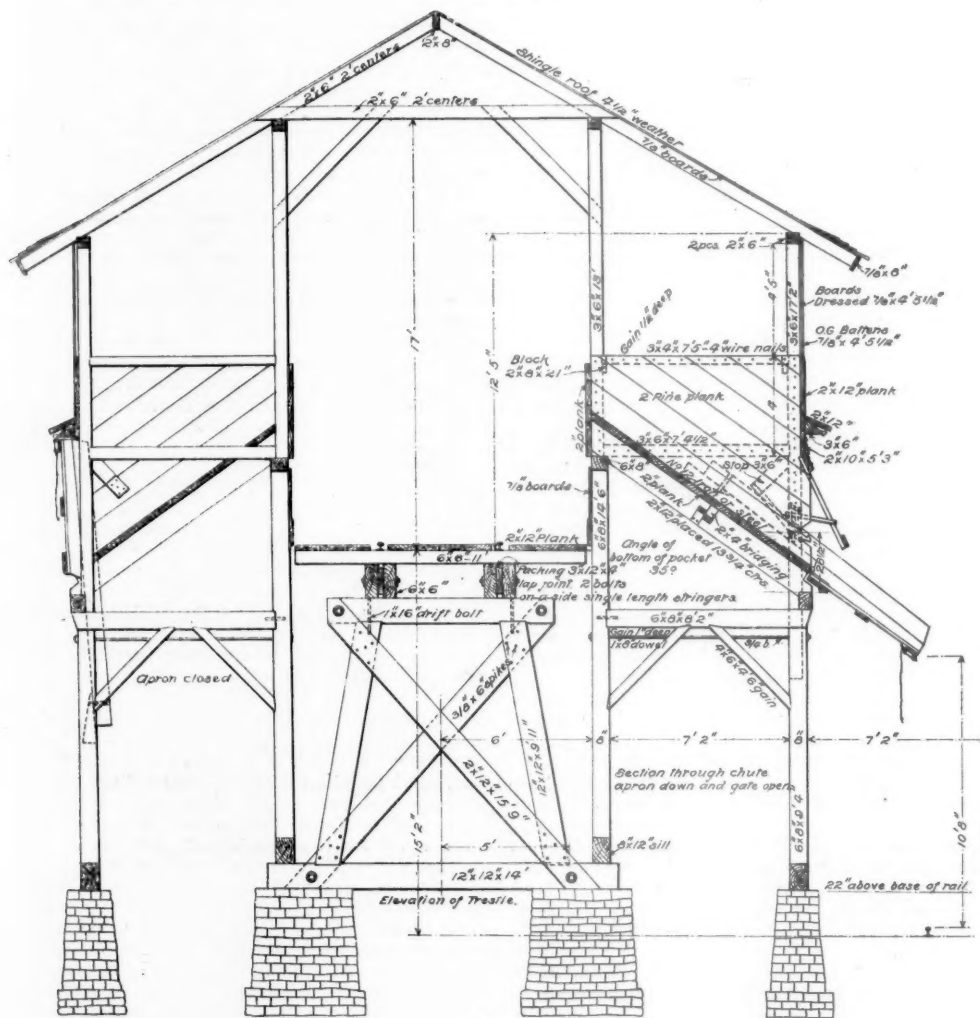


Fig. 5.

PATENT AUTOMATIC COAL CHUTE.

Made by WILLIAMS, WHITE & Co., Moline, Ill.

and to the ends of the latter are fastened cast iron blocks, of about fifty pounds weight each, which may be moved forward or back, to adjust the proper balance. In taking coal the fireman pulls a small latch at the top of the apron, which, when slipped, allows the easy lowering of the apron, because it is balanced. As the counterweighted arm rises it comes in contact with the tail of a pivoted latch which releases the inner, or retaining, coal door. The sides of the apron are spread wider than this coal door, and are formed by the forward end of the counterweight arm. To the lower part of the apron the hinges on which it and the arms are swung, are fastened, there being a slight drop to the coal as it passes out of the pocket on to the apron.

Back of the fulcrum line, about 2 ft. on each arm, is fastened a small ratchet plate, into which works a

This arrangement of catches (with the exception of the one at the top of the apron) is entirely automatic, and all the pieces have been made of such proportions as to especially provide for durability. This point requires special attention in the design of any structure of this character, as it is not desirable to be obliged to have any mechanism liable to break or get out of order at outlying coaling stations. There is not only the expense of taking down the parts and sending them to the shops for repairs, but the break may occasion the delay of trains either in getting coal or in the inability to close the pocket properly.

In fig. 3 a special form of pocket is shown, for taking part, or all of the coal, as is needed. The partition door is hung in the usual manner, and shuts against the iron shod oak planking of the incline. The latching device is quite ingenious, and consists of long T-shaped arms

pivoted a little below the centre, and tilted out of the perpendicular by a rod pulled from the front of the chute, thereby disengaging the small pin projecting from either side of the partition door. This pin slides in a guide slot, the arc of which is struck from the hinge centre. This form of pocket is only used occasionally, and then with but part of the pockets at a station. Their advantages over the single pocket are, however, becoming appreciated, and their use is increasing.

Fig. 4 shows the style of framing used where coal is unloaded into the pockets from bottom or side dumping cars. This form permits also the unloading from the ordinary car with shovels, and is well adapted to roads having large numbers of dump cars, but which are liable to receive coal at times in foreign cars. The roof in this case is abandoned as unnecessary, in part at least.

Fig. 5 shows in a condensed form the pockets both open and closed, and the style of framing best adapted for use at division points with regular gondola cars in the service.

With any form of locking device it is essential that there should be certainty of action at all times and that both sides should work together. Otherwise the filling of the pocket would cause a bulging and straining of the hasps or catches, increasing the chances for failure of the fastenings at the next succeeding unloading. Or should this defect be very marked, there might be an opportunity for the accidental unloading of the pocket on to the track below. With some of the designs of latches this is a source of continual annoyance, and when any of the parts become bent, the trouble begins, so that the fewer the pieces, and the straighter and simpler they are in outline, in so far as this evil avoided.

Another system is the raising of the centre track high

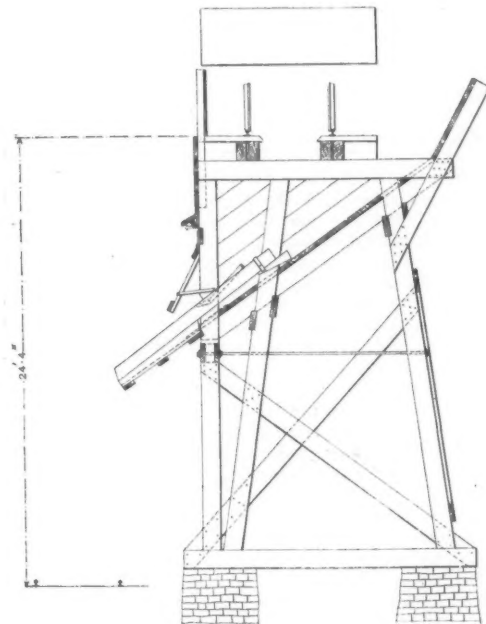


Fig. 4.

above the pockets, so that the cars may be dumped in either direction and provided with runners between pockets to prevent overflow. This, however, allows considerable fall for the coal, and increases the quantity of dirt or slack. It also necessitates the building of the chute much stronger than otherwise, on account of the thrust against the front of the pocket, due to the momentum of a large body of coal falling this distance from the car above. The extra cost of a high trestle and the daily expense of raising the loaded cars this additional height would be factors against this form unless otherwise unavoidable.

As generally built the pockets are placed 6 ft. 6 in. centres, the inclined approach being on about a 1 to 16 grade, built up of bridge timbers, either on piling or trestlework, with 16-ft. bents. This will, of course, be governed by the ground space available and the position of adjoining buildings.

The form of chute shown above is controlled by Williams, White & Co., of Moline, who have erected for different roads a large number of pockets. Wherever the work of erection is done by the railroad building department, the irons only, consisting of the latches, catches, weights, locking bolts, stops, etc., are furnished by the manufacturers.

The Fontaine Continuous Crossing.

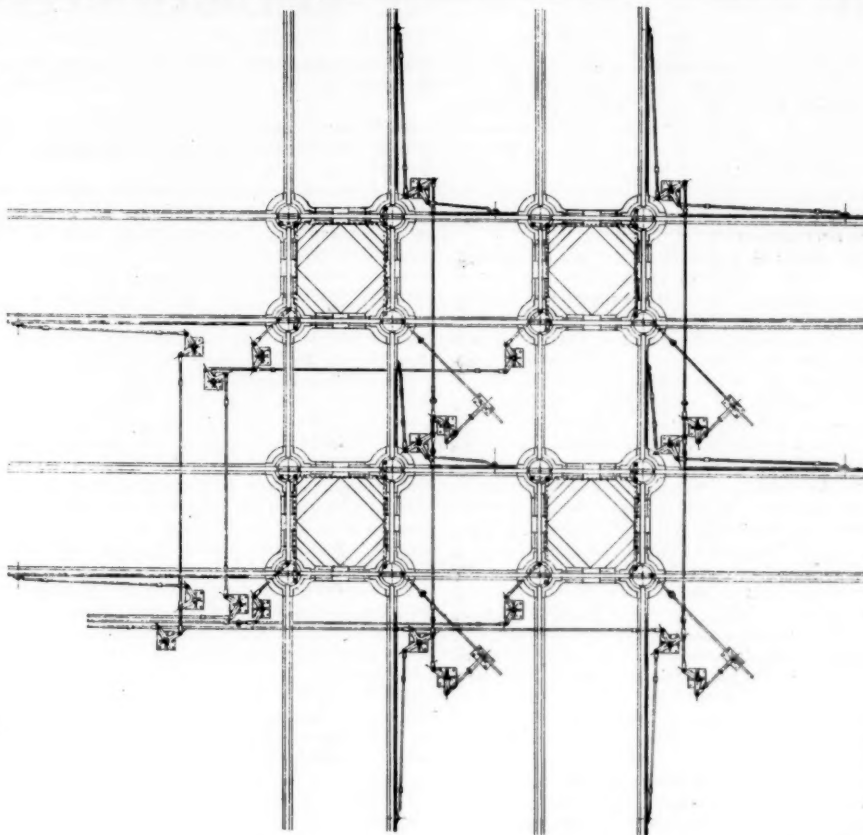
In our issue of June 19 we showed a plan of the Fontaine crossing as heretofore built, and also a diagram giving an arrangement for working it from an interlocking tower. The illustrations published to-day show a considerable improvement in the crossing itself. Heretofore the main frame of the crossing has been made of plates and angles riveted and bolted together. In the improved form, this is made of four 10-in. steel I-beams, which are bent at each end to form the curves inclosing

the turrets, and are spliced there by steel plates, as shown in the general plan and in the sections. The turrets which carry the moving sections of rail are supported by cast steel plates riveted to the flanges of the I-beams at the corners. These are shown in detail in the illustration, and are shown very distinctly, in place, in the section C D.

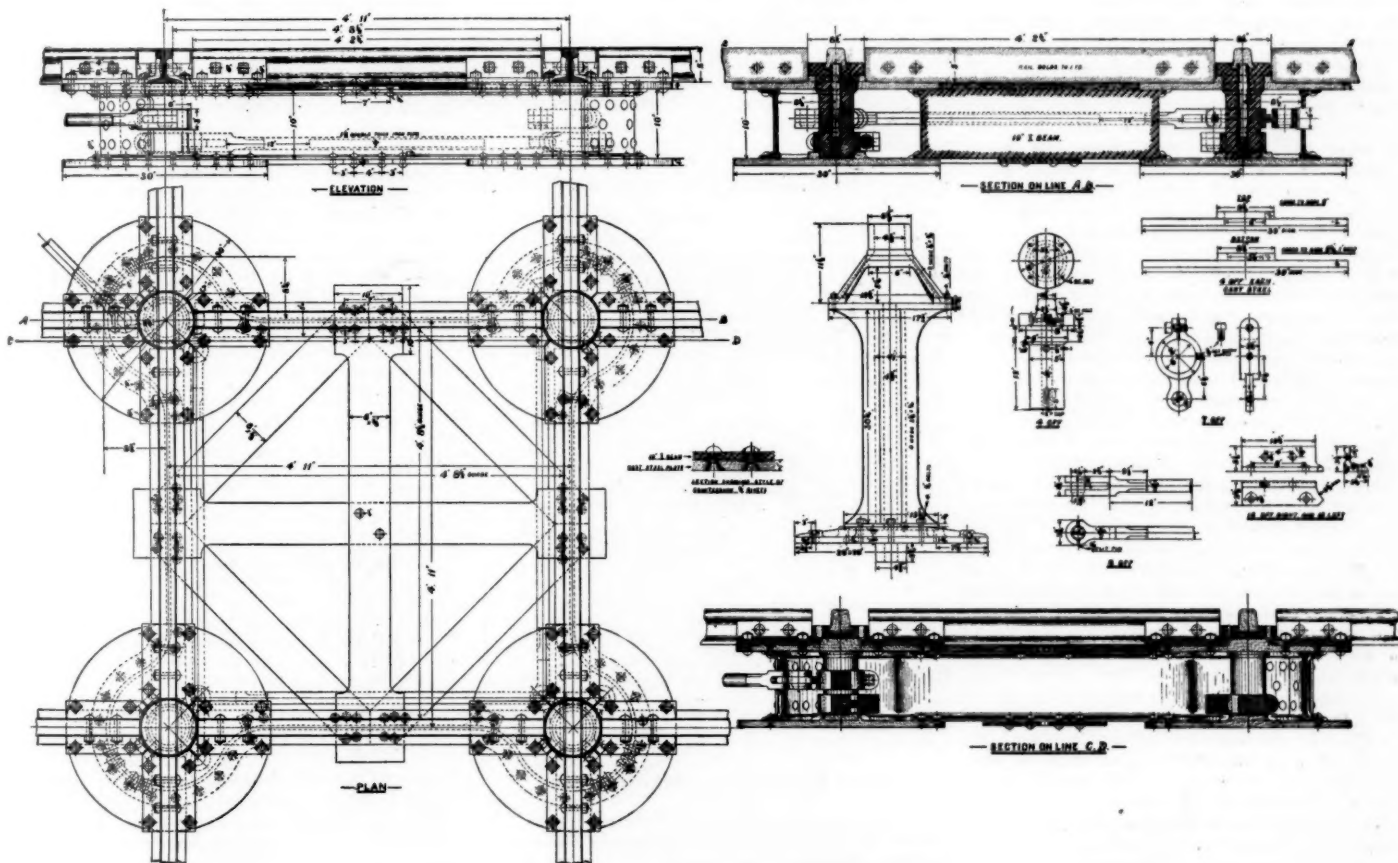
The connections which move the swinging pieces of rail are run in a series from one corner right around the square. Heretofore two turrets standing diagonally have been operated directly by the same connection, and the two intermediate turrets have been moved by connections to these. The present arrangement makes it possible to insure the proper movement of each turret and the accurate register of the rail which it carries. This is done where the crossing is worked from an interlocking tower by using a separate locking lever which actuates a bolt locking into a rod connected to the last turret which it moves, and this same lever carries a detector bar. It follows that unless each turret is moved, and moved its proper distance, the locking lever cannot be moved, as the locking bolt will not register with the bar connected to the last turret. It follows also that the crossing cannot be moved while a train is passing over it. In other words it may be thoroughly protected by the familiar principles applied in the protection of facing-point switches.

The crossing has been further stiffened by right angle and diagonal braces, as shown in the plan. The details of the improved crossing are very clearly shown in the illustration.

The diagram shows the scheme for moving Fontaine crossings at the intersection of one double track with another where the crossings are to be operated from an interlocking tower. The scheme for moving the swinging sections of rails and for insuring their absolute locking on the ground is very clear from this diagram. Of course it is understood that the detector bars are shown only in about half their length in our illustration. The motion of each crossing may be seen by beginning with the lower lefthand corner. It will be noticed that the middle one of the three rods actuates both crossings.



Operation and Locking of Fontaine Crossings from an Interlocking Tower.



THE FONTAINE CONTINUOUS RAILROAD CROSSING.

Made by THE FONTAINE CROSSING COMPANY, Detroit, Mich.

Beginning at the lower lefthand corner of the first crossing each turret is moved in succession and finally, connected with turret No. 4, is the rod which is locked by what corresponds to the facing-point lock. This will be seen at the lower right hand of each crossing. The lower one of the rods leading out from the tower, it will be seen, actuates the locks and detector bars for all four of the crossings. By this arrangement the four crossings are worked and locked by three levers, two to move the crossings and one to move the locks and detector bars. This scheme has been devised by the Union Switch & Signal Co.

The Fontaine Co. has recently supplied four crossings for the Chicago & Northern Pacific, to be used at Forty-ninth Street in Chicago, and it has put on exhibition in New York a model. This may be seen at 32 Nassau Street, room 615.

How to Prevent Leaky Flues.*

The question of maintaining flues in locomotive boilers is a vital one when we come to consider the cost of repairs to the boiler as a whole. Generally speaking, it costs more to maintain the flues and keep them in repair than any other part of the boiler, and this is largely due to several distinct causes and conditions, among which may be cited the following:

First, inferior material; second, poor workmanship in preparing them and setting them; third, bad water, which in some localities is worse than others; fourth, neglect on the part of those having immediate charge of the boiler to properly care for it, and in some cases a lack of knowledge as to what constitutes proper care.

*Read by Mr. F. A. Stinard at the meeting of the New York Railroad Club, Nov. 19, 1891.

The first question that presents itself is, taking into consideration the kind of fuel, and the quality of the water we use, what kind of material is the best for flues. In the line of economy, the best is the cheapest in the end. Steel and iron are the two kinds of material almost universally used for boiler tubes at the present time, which may be due to the fact that they are cheaper and have greater strength than copper or brass. I will consider them briefly, and that only as regards the conditions requisite in either metal in order to have the best results. The metal should be homogeneous, devoid of phosphorus or any other substance that would tend to make it brittle, should be just ductile enough to permit it to be extended without fracture, as in this case, I believe you can go too far, and make it so soft that the remedy is, so to speak, worse than the disease.

Having settled this question, the next one is, how

should the flues be prepared for setting. In practice the writer has found the following to give the best results. In the first place the ends should be annealed, then put into a die and reduced in diameter just enough, and no more, than is necessary to get them into the thimble after it has expanded in the flue-sheet. If you find that the end of the flue is hardened by contracting with the die, it should be again annealed, in order to regain the requisite amount of ductility.

Now we come to the most important part. What is the best material for the thimble; if we use copper, what thickness should it be? That depends altogether on not only the diameter of the flue, but the diameter of the flue hole as well. The point I wish to make is this, that, when the flue is set or fastened in the flue sheet, it should not be expanded beyond its original diameter; taking this into consideration it is a very easy matter to determine the thickness of the thimble.

Acting on this principle, I found that where I could arrange to use copper about $\frac{3}{8}$ in. thick, which is No. 18, it gave the best results. My argument on this point is, that, in the first place, where you use a thicker thimble, you have to expand the flue too much before it is tight enough. Copper being of a soft, yielding nature, it is liable to crush out before it is compressed sufficiently between the flue and the sheet; also, by the use of too much soft metal, the strain the flue is subjected to from boiler pressure, or the sudden contraction of the metal, which may be brought about and is liable to occur through some possible neglect on the part of those having the care of the boiler, would have a tendency to loosen the flue in the sheet a great deal easier, and more quickly, than it would where a thinner thimble was used.

Having expanded the flue in the sheet the next thing is to talk or bead it over. There seems to be a difference of opinion as to whether it is necessary to bead the flue at the smoke-box end. I claim that it is just as necessary to bead them at the smoke-box end as it is at the fire-box end. Calking, or beading the end of the flue, when properly done, is adding an element of strength to it after it is expanded, and assists it in retaining its hold in the sheet when exposed to elements that would tend to expand or contract it. When calking or beading is improperly done, it is detrimental to the life of the flue, in fact, if care is not taken, there is liability to undo, to some extent, what has already been done, in other words, loosen the flue in the sheet. I assume that, to calk or bead a flue properly, and at the same time beneficially, it should, during the process of calking, be held rigidly in the position to which it has been expanded, from the fact that, in the process of calking, the blow is transmitted longitudinally, instead of laterally. In order to meet these requirements, my practice was to use plugs or mandrels which were slightly tapered; these were driven into the ends of the flue at the same time, and the ends calked or beaded around them. I am opposed to the use of what is commonly called the heel tool, which is so extensively used at the present time, as I firmly believe it does more harm than good.

Poor workmanship is neglect on the part of the workman to fulfill all or part of the conditions that are absolutely necessary, in order to have the best results. How often have we heard the expression used by workmen, "Oh, that is good enough." We emphatically declare that there is not anything that is good enough, until it is just right. Bad water, or in other words, water that has more or less lime, alkali, salt, or other sediment in it, that may be deposited and incrustate itself upon the surface, is to a great extent the cause of leaky flues. It is a well known fact that the largest amount of incrustation is developed on the lower flues, while the upper ones will be comparatively clean and free from it, and what is the result? Unequal expansion; the flues become what is commonly called mud burnt, the ends will chip or break off, and the flue becomes loose in the sheet. This trouble can to a great extent be obviated by washing the boiler out thoroughly and as often as necessary in order to prevent incrustation with all its attendant evils, for it is an old and true saying that an ounce of prevention is worth a pound of cure. When flues are covered with incrustation and commence to leak, you endeavor to stop them by expanding, rolling, calking, and ten chances to one you will have to repeat the dose before the engine has made two trips over the road. I believe the only remedy for flues in that condition is to take them out and clean them and reset them.

A reprehensible practice, and one that should be curtailed as much as possible, is running with the furnace door open and allowing cold air to pass through the flues, which, accelerated by the action of the exhaust, will very soon cause them to leak. The furnace door was not made or ever intended to be used as a damper. Engineers should avoid as much as possible pumping water into the boiler when not using steam; in fact, they should guard against anything that would have a tendency to cool off the flues suddenly, thereby causing a sudden contraction of the metal while under pressure, which if repeated a few times will very soon loosen them in the flue sheet and the result is trouble and expense. The engineer should see that the flues do not get stopped up with ashes and dirt; when 40 or 50 flues get choked up, the process of boring them out is liable to start them leaking. When flues are in this condition the fireman

has to work a great deal harder to keep up steam, and the harder he has to work the more fuel he wastes.

DISCUSSION.

Mr. WEST: I would like to ask what sort of tool Mr. Stinard uses in connection with this mandrel or plug? How he turns the beading over?

Mr. STINARD: It is a half round tool, to follow the tool around. It is the same kind we used to use for copper flues years ago. You must hold it over and rotate it in the flues during the process of calking. I can drive a flue out of the sheets with an ordinary blow before you caulk it. I believe you loosen that flue if you caulk it with an ordinary heel tool.

Mr. WEST: If this is true, why do we have so little trouble with the front ends, or the smoke-box ends, of the flues where there is no beading? We never bead in the front end, and never have a leaky flue.

THE CHAIRMAN: Do you use copper liner?

Mr. WEST: Since we had the last discussion here; not before. I am going to see if there is any good in the copper liner. I think the engine has already run longer than before, but that does not answer Mr. Stinard's question or satisfy me in regard to this claim that beading or hammering there is what keeps the flue tight. The tightest thing we have is the end not beaded at all.

Mr. STINARD: My claim is that the calking is not for the purpose of making the flue tight, only an added element of strength. Any sudden contraction or expansion of the metal will tend to move it. By the calking you add strength.

Mr. WEST: We purchased two grades of flues. We bought the cheapest one and the best one, and I put the cheap flue on one side, and the other on the other and the fireman and every engineer that has run the engine says he has not seen any difference.

Mr. SEWELL: Do they both leak?

Mr. WEST: They are just beginning to leak. With regard to one clause in Mr. Stinard's paper about the flue being too hard as well as too soft, I believe that is true. My own experience has been that the leaking of flues is not caused by an expansion of the flue sheet, but more by the contraction of the flue. The foreman has called my attention to the fact that he could put an ordinary hammer handle in and shake the flue sent out 24 hours before. Occasionally you get an engine in which a few flues will be loose. The beading is not pulled off those flues, but they are loose in the sheet. It is not due to the expansion of the sheets.

Compound Locomotives Built in the United States.

In our issue of Nov. 27 appeared a list of compound locomotives built to date by the Baldwin Works. The following table shows nearly, if not quite, in full the compounds built elsewhere in the United States up to this time.

BUILDER.	Road.	No. engine.	Type of starting gear.	No. of cyls.	No. of wheels coupled.	Diam. of H. P. cyl.	Diam. of L. P. cyl.	Stroke.
Old Colony R. R.	Old Colony	1	Dean	1	4	in.	in.	in.
Lehigh Valley R. R.	Lehigh Valley	1	"	1	8	20	28	24
Schenectady Loco. Wks.	Michigan Central	2	Pitkin	1	6	20	29	24
"	East Tenn. Va. & Georgia	1	"	1	6	19	27	24
"	"	2	"	1	8	20	29	24
"	Atchison, Topeka & Santa Fe	1	"	1	6	20	29	26
"	Southern Pacific	1	"	1	8	20	29	26
"	"	1	Pitkin Improved	1	8	20	29	26
"	"	4	"	1	6	20	28	26
Rhode Island Loco. Wks.	Brooklyn Elevated	3	R. I. L. W.	1	4	11 $\frac{1}{2}$	18	16
"	For stock	1	"	1	4	18	28	24
"	Mexican Central	6	Johnstone	1	6	14	24 $\frac{1}{2}$	24
"	Kings County	1	R. I. L. W.	1	4	12 $\frac{1}{2}$	20	16
"	Jamaica Ry. Co.	1	"	1	6	18	28	24
Brooks Loco. Wks.	Lake Shore & Mich. Southern	1	Brooks	1	6	17	28	24

* The diameter is the equivalent of the actual cylinder of 29 $\frac{1}{4}$ in. diameter less the space 16 $\frac{1}{4}$ in. diameter occupied by the H. P. cylinder.

The "National" Car Heating System.

The illustrations show the "double drum" and "double circulation" systems of the National Car Heating Company (Chicago). Figs. 1 and 2 show the arrangement of the piping of the "double circulation" system. By it the heated water is carried to both sides of the car when either fire or steam is used as a source of heat instead of to one side first and then to the other, as with the ordinary Baker heater system. In this way the heat is more uniformly distributed. The construction and operation of this system are clearly shown on the drawings, and but little further description is necessary. Steam passes from the train pipe at *D* laterally and vertically to the top of the drum, where it is controlled by the valve *Q*. In this drum is a coil of pipe containing the water of circulation. The condensed water from this drum flows downward into the condensing chamber and passes out from the automatic, periodical, steam trap. The valve *G* can be closed to prevent the emptying of the condensing chamber when the cars are in a station. The heated water in the drum rises into the car and passes to the left and to the fire heater through the pipes placed under the seats, as shown. Rising through the heater the water passes to what is termed the "water dividing fitting" shown near the expansion chamber. At this point the water of circulation is divided into two streams, one for each side of the car,

The stream for the opposite side of the car is carried through a cross-over pipe, as shown. Both currents of water commingle at the "water uniting fitting" and pass as one current into the coil in the steam drum. When a car is at the end of a train, one of the valves, *B*, is closed and the other opened. The arrangement of the condensing chamber and the drum coil is shown in fig. 2. One peculiarity of this system is that the water of circulation does not pass through the expansion chamber.

The "double drum" system is shown in figs. 3 and 4, and the various parts are designated by letters which correspond to the following described details: *A*, is the drain pipe; *B*, the asbestos lined valve in the drain pipe; *C*, the steam heating drum on both sides of the car; *D*, branch-pipes from drain pipes to coils in steam drums; *E*, receiver for condensation; *F*, steam trap; *G*, valve between condensing chamber and steam trap; *H*, branch pipes from coils in steam drums to condensing chamber; *I*, coil in heater to be used when there is no steam; *J*, expansion chamber; *K*, special fitting in which the water circulation is freed from air bubbles and steam. With this device the air and steam are passed to the expansion chamber *J*; *L*, heating pipes on one side of the car; *M*, crossover pipe leading to steam drum on the opposite side of the car; *N*, heating pipes on second side of the car; *O*, return crossover pipe leading to steam drum on the initial side of the car; *P*, pipe leading to coil in heater; *Q*, valves to control steam supply.

In this system the valves *B*, *G* and *Q* are used as before. There are two drums, details of which are shown in fig. 4, in which the water is heated in the same manner as the system just described. This is a double circulation system when heated by steam, as the two sides of the car are independently heated by the two drums, as clearly shown in the illustration; but when heated by fire in the heater, there is but a single circulation system, such as is had with the Baker heater.

The advantages claimed for the double circulation system are uniformity of heat on both sides of the car; a possibility of largely increased heating surface without reducing the rapidity of heating. It is claimed that in cars requiring over 500 ft. of pipe for heating circulation is obtained in from 15 to 20 minutes. Another advantage claimed for both these systems is that by using a condensation chamber below the car, the condensed water from the train pipe is removed at each car, and there is less loss of pressure at the back end of a long train. No change is required in the Baker heater piping in the car to apply these systems. The double drum system is used where railroads already equipped with a single circulation system would prefer to keep that system instead of changing to double circulation. The trap used is one which opens periodically, and is therefore not drizzling at stations. With this system of heating there are no

valves to handle when changing from steam to fire heat. It is only necessary to build a fire in the heater. The action of the fire does not interfere with the steam, or vice versa. It is one of the strong claims for this system that it is so simple as to require but little, if any, instruction to operate it.

Tools and Machinery for Railroad Work.

At the December meeting of the New England Railroad Club the above subject was opened with a paper by Mr. E. E. Davis. An abstract follows.

A very large percentage of the shops are equipped almost entirely with machinery bought years ago, and gives the tools such an age that even if they were not worn in the least, their capacity for work would be very far behind the more modern tools, both in amount and quality of the production. But when to these defects is added the wear and tear of years of service, so that the lost motion in every wearing part is such that it is next to impossible to turn out even a fair piece of work, there is assuredly a tremendous waste of money. Not only does the manufactured piece cost extra on account of the longer time required to make it, but when done it isn't as good as the modern tool would have produced, and of course it will not last as long in actual service, and here is another waste of money. Then again it takes two or three times as much power to keep the old traps running as is required for a good set of machines. . . . What can we do with a lathe or plane made 20 years ago when comparing the quantity of work done by it with that done by machines made to-day? A planer running 10 or 12 feet per minute with the feed so fine you can't measure it won't answer at the present

time. We want a planer to run from 16 to 30 ft. per minute with table traveling from 3 to 1. There are planers made to run 5 to 1, but I think they are under repairs one-half the time. We want a lathe to run from 25 to 45 ft. per minute, with feed from 1-32 to 1/2 in. according to the class of work it is on. There are tools made to-day for nearly every kind of work, and these improved tools are what every shop that has the work for them needs.

The advantage of the screw machine as an addition to the shop equipment may be mentioned. It is without doubt, for what it can do, capable of saving from 25 to 500% in the cost of work done. When a machine can be had by which you can put a piece of work through a half dozen different operations and finish it complete before it comes out, you have a great advantage over being obliged to produce the same in a lathe, where the lathe must be stopped and the tools changed for each operation; and in the case of the lathe the uniformity of product is nowhere near equal to that of the screw machine. In much of the work done by this tool one machine will produce in a day a quantity equal to what four or five lathes could do with a first-class operator at each lathe. Take the studs for a boiler for one thing. They can be finished on the screw machine in the same time that they can be drilled and countersunk for a lathe, say nothing of turning. Very few shop managers understand to what extent the milling machine for general shop practice could be judiciously used. It is fast taking the place of the lathe and planer on certain kinds of work, and the time has come when no railroad machine shop is well equipped for economical work without some milling machines. Some kinds of work can be done 25 per cent.

in running a stick through the planer, crosscut saw and tenoning machine, located as they were at the first, but a change was afterward made, by which the stick could be run through from the planer in six minutes; so that not only does the question come in as to what kind of shop tools should be used, but I believe also that economy demands that they should be located with a view to the least handling of the materials.

Mr. LAUDER: One of the hardest things is to get an average railroad manager to comprehend the absolute need of modern machinery in our railroad shops. He seems to entertain the idea that a tool once put into a shop is supposed to stay there for life. . . . Probably there is no such wasteful leak about the railroads of the country to-day as attempting to do the repairs necessary on rolling stock with old machinery. I remember a prominent locomotive shop a few years ago in this country, where large numbers of locomotives had been built for 40 years, and one day the superintendent, in showing me over the works, took me into a room in the upper story and showed me four quite large chain planers; that is a planer driven by an endless chain. Those tools were in daily use when he took charge of the shop, but they had been idle since then, having been replaced by more modern tools, and these would be relegated to the scrap heap. I suggested that two of them might be cleaned up, and perhaps painted and kept for antiquarian curiosities. I hope to see some of these identical machines exhibited at the Columbian Exposition. . . . We have in our shops in South Boston a planer to-day, that we have not yet put into the scrap heap, that has on it the legend "Aldrich & Calvert." I commenced to learn my trade

use the machine for a week, I think it has paid us for the money invested, because it would take a man perhaps a week to plane those sills with an old fashioned planer. The same argument would apply to the improved mortising machines. In fact the economy of railroad work to-day is in the use of improved machines; and I believe with Mr. Davis that with good machinery and a good man at the head of the department, any railroad shop can fairly compete with any contract shop in doing their own work. The four machines I have mentioned—the four-sided planer, the tenoning machine, the cutting-off saw and the mortising machine—could be put in for perhaps \$4,000. The interest on those machines would probably be not less than six per cent., say \$240 a year. I think any railroad company with five or six thousand cars or more can well afford to fit their shops with machines that will take care of their work and do it as quickly and as well as they need.

The PRESIDENT: I am a thorough believer in modern tools. I had occasion some months ago to visit the shop of Mr. Davis, where I saw a pneumatic hoist in operation, and I went home, and have built about 12 of them—4 in., 6 in., and 7 1/2 in. It seems to me it is an invaluable tool for every shop and I think they would be useful wherever there was a steam plant. The following table will show their capacity:

4 in.	70 lbs.	lifts	658 lbs.
6 in.	100 "	"	929 "
7 1/2 in.	100 "	"	1,087 "
6 in.	70 "	"	2,113 "
7 1/2 in.	100 "	"	2,925 "
7 1/2 in.	100 "	"	4,189 "

I don't see how any railroad shop can get along without these tools with an overhead railroad. I am building overhead railroads outside the shop to unload cars and teams, as well as inside. In drilling 30-ft. rails for laying a second track, I had one cheap mechanic and one laborer, and they handled about 20 rails a day, but I found that one of my hoists in the blacksmith shop would change 32 rails and that the machine paid for itself every 17 days. A 4 in. machine costs about \$18 and a 6-in. machine about \$28.

Concerning Cross Ties.

BY H. D. MASON.

Purchasing Clerk, Allegheny Valley Railroad.

The subject of railroad cross ties grows more interesting in proportion as our forests dwindle in extent. The time is near when the question as to what shall take the place of wooden ties will press upon us for an answer. It would seem that before the present generation is gone the problem must be solved. The subject is of so wide a range that I can cover only a very small portion of it; indeed, I can treat it only locally, as applied to Western Pennsylvania. The conditions there probably do not differ materially from the conditions elsewhere in the Middle States. The hard woods which clothe the picturesque Western Pennsylvania hills have furnished millions of cross ties, and are still furnishing a scant supply, but the end seems near. Not only is the woodsman or the farmer at work on every timber tract, taking all salable timber as he goes, and yet only partially supplying the growing demand; but forest fires are decimating much of the younger growth that the axe has spared. It is to be regretted that there is yet no organized effort to prevent the waste of timber, and to provide for a supply in the future. The question as to what shall take the place of the wooden cross tie is timely; but is not within the province of this paper to conjecture. I merely wish to write of the present tie as I know it.

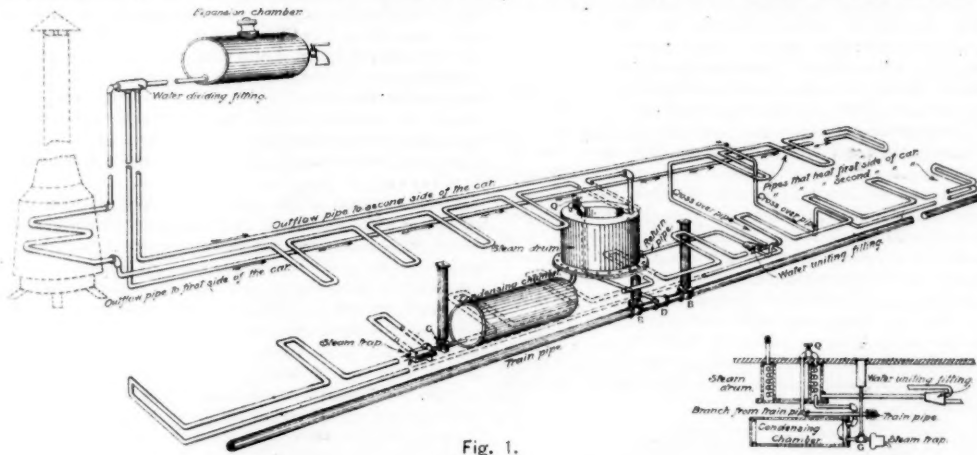


Fig. 1.

THE NATIONAL CAR HEATING COMPANY'S APPARATUS.

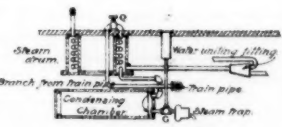


Fig. 2.

cheaper on the milling machine than on the planer and 50 per cent. cheaper than on a lathe. . . . One of the modern tools for heavy work is the vertical boring and turning mill. Most shops do all of the heavy work on the driving wheel lathe. With the boring mill you can bore a tire quicker and with half the help. Take for instance a driving wheel center; the extra labor in shifting the heavy casting around on the driving wheel lathe will pay the whole expense of fitting the casting ready for the axle with the turning mill. Another new fangled idea, as some are pleased to express it, is the way of hoisting and conveying the heavy work from one machine to another or one part of the shop to another. That is the overhead railroad with the pneumatic hoist, and this hoist is as far ahead of the chain hoist as the chain hoist is ahead of manual labor.

In blacksmith shop tools, there has been the same improvement as in every other department, and I think the majority of shops, so far as they have room, have quite modern tools; in fact, more so, according to the number of machines, than any other department; but there are some shops where they use the same old beam trip hammer, where you have to pull a string connected with the binder to see it go. . . . In some boiler shops there are men who say they can't do the work so as to compete with outside people. Well, that is right, but where does the trouble lie? Take a well equipped boiler room with punch and shears, power bending rolls and steam or hydraulic riveter, planing machine, drills, cranes and overhead railroads for handling work, and this shop with a good man at the head will turn out as good work and do it as economically as any outside people can, and the production will last 25 per cent. longer. . . . One day while talking with a man engaged in turning off driving tires, I asked how long it took to turn a pair of wheels. He said: on an average, about two days; when they were very hard, sometimes four days. He had several kinds of steel for lathe tools, and when they all failed he had a piece of Mushet's steel at the bottom of his draw to fall back on. I don't intend to enter into a discussion as to the merits of different kinds of steel, but there are some shops that are using for 60 per cent. of their lathe and planer work, Mushet's steel, and it is cheaper than any other steel, even if it costs \$3 per pound.

Another important factor in the successful operation of a railroad machine shop is the tool room. This is a place where much money can be saved by starting a thorough system of classification and arrangement. It is also highly important that this room should be equipped with all modern tools that will be required and to have enough of them so there will be no man waiting on one job while some other man is using the tool he needs, and another point is not to expect a tool to perform a dozen different services when there should be a separate tool made for each piece of work.

Mr. CHAMBERLAIN: Mr. Davis has dealt but little with wood machinery tools, and I suppose purposely did not wish to bring that matter in. But what he has said about motive power tools is also to be said of wood machinery tools. The location of such tools is of very great importance. For illustration, I remember being connected with a concern which had in their wood machine shop as fine tools as could be procured anywhere in the country, but their location was decidedly wrong. For instance, a large planer was placed so that the lumber brought in passed by the planer and went to several other machines, and then back to the planer. In that shop were 24 machines, and in order that the work should be moved right along from one end of the shop to the other, without going back to any machine after it had passed it, my judgment told me that 23 of them should be changed. Forty five minutes were consumed

30 years ago, and that firm antedated that time. That was a famous firm of tool builders in those days, and they made excellent tools; otherwise the tool would not be in active service to-day in the Old Colony Railroad shop. It has been fitted up for a special purpose, and is only used occasionally. . . .

With reference to wood-working machines, I think our shops, as a rule, are more deficient in proper appliances for building cars and doing repairs than are the locomotive shops, because tools can be got along without in woodwork better than in the machine shop, and the work can be done by hand; but the loss sustained by the railroad in consequence of the lack of proper tools and machinery to do the car work is perhaps as great as it is on account of the very defective machines in the locomotive shops. If you have a four-sided planer for your sills everything comes out square and the work comes together well, and it costs very little to frame it in comparison with framing work that has never been planed, and the work saved by using such a planer instead of hand work is enormous in the aggregate. The same principle applies to all the shops of a railroad.

There are very few roads that can perhaps afford to use power riveters. The amount of riveting that can be done with a hydraulic riveter about a locomotive boiler is so little that it is questionable whether there would be any saving in putting them in where only repairs are done. If there is a large building where many boilers are built, the power riveter undoubtedly would be an economical tool. There is one other tool rarely seen in railroad shops, which I consider one of the most economical labor-saving tools that can be put in, and that is the plate planer. Since steel plates have come into extensive use it has become almost a necessity in a well regulated railroad shop to have a plate planer. The advantage of it is that the plate is prepared for caulking in a very much better manner than could be done by the finest workman. Then, again, there is no danger of cutting the groove and weakening the parts so as eventually to produce a rupture, as there is with hand work; with reasonably careful caulking the plate is left intact and of its full strength.

Mr. MARDEN: I don't think any argument can be raised against the use of the best wood machinery or the proper location of it. I think I have never been refused the privilege of buying a machine if I thought we ought to have it since I have been with the Fitchburg road. . . . The location of machines in shops is a matter which should be carefully studied. It has been said to me that with the machinery we have in our shops we are losing money, the interest on the cost of the machines, because we do not have work for them all the time in repairs. I have met that argument in this way: For instance, we have a four-sided planer capable of planing sills at the rate of one a minute. We have immediately on a line with that the cutting-off saw, and further down the shop a tenoning machine, and yet further on a mortising machine, and so when the lumber has passed through these machines it is nearly ready for the car. Suppose we plane 50 sills in that four-sided machine in 50 minutes, and we don't

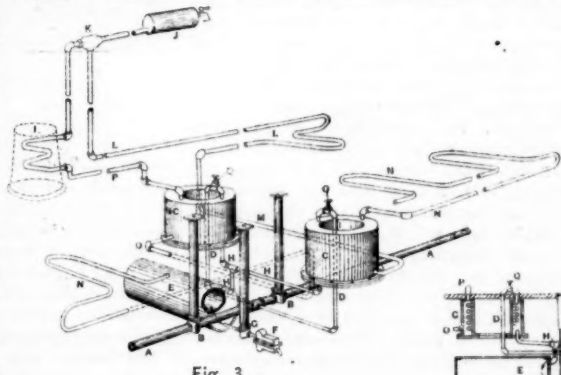


Fig. 3.

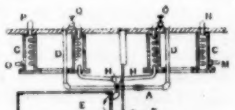


Fig. 4.

Pennsylvania furnishes various kinds of oak, varying in quality and durability. Our standard cross tie is 8 1/2 ft. in length, 7 in. in thickness and averaging 7 in. across the face. When we get a tie of these dimensions made of tough, second growth white oak, we have the best timber for the purpose our hills afford. An inky blueness in white oak indicates good quality. Young, second growth trees have far more vitality than larger and older timber, which may appear quite as sound to the inexperienced eye. Next to white oak comes rock (or chestnut) oak, almost as valuable as a cross tie—hard, tough and durable. Farther down in the list comes pin oak, fairly durable as a tie only when made of young and thrifty timber, cut in winter. Pin oak is said to derive its name from the fact that pins for joining heavy timbers were formerly made of it; but it is also maintained that the name comes from the numberless tiny holes apparent in the grain of the wood when cut crosswise. Red oak makes a very inferior tie, rotting rapidly when placed in the ground. It may be detected by its sour odor, and by the openness of the grain, which in that respect resembles a rattan. Black oak is also of inferior quality, and is never used as a main track tie.

In addition to the various species of oak which I have partially enumerated, there are other trees growing in Western Pennsylvania that furnish timber for cross ties. Prominent among them is chestnut, very durable when placed in the ground; but so soft that spikes do not hold well in it and the rail cuts in rapidly. The practice is to use it in sidings. On straight reaches it is sometimes used sparingly in the main track; but never on curves. Locust makes a most durable tie; but scarcity precludes its use. Hickory (also scarce) is subject to powder rot, and is not so durable as white oak. We have had a small number of hickory ties in our main track for seven years, and they are still in fair condition. Maple rots rapidly; cherry is inclined to split when spiked; pine is both soft and expensive, and hemlock cannot withstand the alternately wet-and-dry condition which is the fate of a cross tie. Strange to say, a few black walnut ties find their way into the market; but I am not prepared to speak of their merits.

The durability of a tie depends on many things—the season when cut, the age of the timber, the place where it grew, the condition in which track and ditches are kept, are all important factors. The best ties are cut in winter, while the sap is down. Chestnut oak is often peeled for the bark, being cut for the purpose about June. Ties made of such timber are not durable. Timber cut in the summer rots more rapidly than that cut in cold weather and is apt to split in the sun. Trees growing on ridges produce less desirable timber than those growing on low lands, as a rule. Oak timber grown on different parts of the same farm varies perceptibly in quality, and this holds true of opposite banks of a stream. Where ground has been burnt over the scorching affects the quality of the timber, although it may not kill it.

With such varying conditions, any statements concerning the life of cross ties must be at best mere approximations. The same grade of ties show widely varying results on different sections of the same railroad. It may be roughly stated that the average life of a cross tie in the main track is eight years. It varies from four to 12 years. In a crowded yard, under very heavy traffic, four or five years may be a long life. Where the traffic is light the results are more favorable. On sharp curves the wear is much greater than on straight reaches. The condition in which a track is maintained is a vital factor. If the line and surface are not kept up to a good standard, if the rails are not well braced on curves, if the ditches are not kept open, spikes pull loose, rails cut in and decay becomes more rapid.

The great factor in the destruction of a tie is natural decay. All other causes combined do not wear it out so rapidly as the corroding action of the elements. Frost and water search out its weak points, assisting the rail to cut into it; dry rot works at the heart until it becomes a shell. How may decay be prevented, cheaply and effectively? So long as our timber supply equals the demand, this question will not be answered. Tie plates have not yet sprung into general use with us, and their merits are undecided. We are not in position to either praise or condemn them. It seems reasonable to think that they would prove economical on bridges and in busy yards. Their adoption would doubtless prevent the cutting in of rails and enable railroads to use softer (and hence cheaper) ties; but they would avail nothing against natural decay. It is questionable whether they would add perceptibly to the life of a white oak tie, especially as our experience shows that a tie rots out quicker than the rail cuts into it. The rail frequently cuts into a white oak tie quite an inch, but the tie would still serve its purpose had not decay rendered the remainder of it too soft for safety.

Artificial processes for preserving ties have not come prominently before us as yet. I do not know of any railroad in Western Pennsylvania where a systematic effort in that direction is made. Some genius has discovered that petroleum is an excellent wood preservative, and if he is right, there are long stretches of oil-soaked track in the oil regions of Pennsylvania that should get the full benefit of its preserving qualities. There are no data to show that ties saturated with petroleum last any longer than other ties. I have found only one fact to support the theory. A trackman of long experience recently told me of some hemlock ties laid 17 years ago in an oil siding which are still in fair condition. How much the petroleum added to their life is not apparent.

Probably one third of the 132 miles on our main line consists of curves. On one side practically all of the way there are precipitous wooded hills; on the other, a rapid river. All the moisture that falls on the hillsides must pass through our track or under it. Our ballast consists of broken stone. Tie renewals average from 300 to 350 per mile per annum. Since 1881 we have kept a careful record of the life of ties. The following data, showing instructions annually issued to track supervisors relative to axe marks to be placed on ties, will convey an idea of our system:

1883, ties to be notched on north edge, 4 in. inside the river rail.

1884, notched on north edge, 1 ft. inside river rail.

1885, " " " " 2 ft. " " "

1886, " " " " 3 ft. " " "

1887, " " " " 9 in. " " hill "

As an indication of the variability of the wear of ties, it may be stated that there are still in our main track a few of the ties placed there in 1881, while some

of the ties placed in track in 1886 were taken out the past summer.

The price of ties varies, according to locality, from 40 to 60 cents each for first class ties; "culls" (or inferior ties) bring about half price. Chestnut ties are worth from 30 to 35 cents each. If a main track tie costs 50 cents, delivered on the right of way, it is fair to assume that the labor necessary to put it in the track and tamp it costs as much more. While we have no exact data on the subject, I am convinced that \$1 each is not far from the average price of a tie in the track. Taking the whole line over, and averaging the sections where traffic is heavy with those where it is light, a good section hand will put in five ties per day. Where there are many trains to contend with, putting in ties is a slow and expensive process.

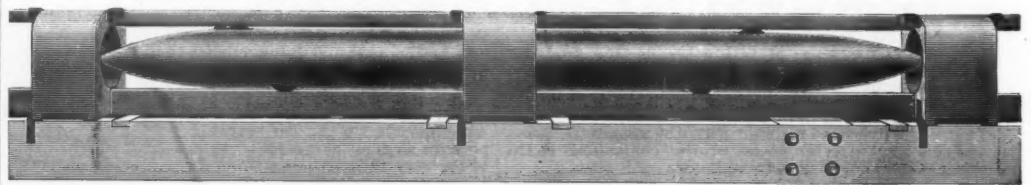
Our ties are largely cut by farmers clearing off their land. They hew their ties, the tracts of woodland being generally too small to warrant putting up a portable sawmill. The ties are hauled from one to ten miles over wretched highways. In winter, when there is snow enough, they are hauled in on sleds. There are also woodsmen engaged in the business. They buy up timber tracts, put in a portable mill, and saw the timber into whatever it will make, ties, bill stuff or planks. There is a prejudice against sawed ties, mainly because they are often made of the older and brasher timber, while hewed ties are usually made from the young, second growth trees, and are naturally more durable.

There are few things more deceptive than the condition of ties in the track. They never rot uniformly; one decays here, another there. Some rot at the surface and are sound within; others solid without are soft and punky at the heart. It requires judgment to tell when they should be removed. The practical trackman will never let them run too near the danger line. A track that is solid as adamant in winter, shows a hundred defects as soon as the frost leaves the ballast. To see a track at its worst one must examine it in the early spring; at its best, in October or November.

A subject of such scope cannot be well treated in so short a paper, and I have, therefore, merely touched upon some of its prominent points.

The "Portelectric" System.

The United States Portelectric Co. has just been organized with the immediate object of furnishing a rapid transmission of mail between the New York and Brooklyn post-offices, and should the system prove practical,



The "Portelectric" Car and Track.

it is to be extended to all the suburbs. Eventually the company hopes by means of this system to put all the larger cities in quick mail communication with each other. The company is organized with a capital of \$2,000,000 under the laws of West Virginia with ex-Postmaster General Thos. L. James as President.

We have already described the experimental plant at Dorchester, Mass., but a very general outline of the system may be interesting at this time.

The "carrier" is a hollow car of wrought iron, cylindrical in form with ogival ends, about 20 ft. long over all, 12 in. in diameter, with a capacity of about 10 cu. ft., capable of carrying about 20,000 letters or the equivalent. The car is to be supported on a single rail, a wheel at each end of the car, and also guide wheels above, running on a guide rail. The carrier is to be propelled by an electric current passing through a series of stationary hollow helices of insulated copper wire, surrounding the track at proper intervals, say every 10 ft. The electrified helices act on the approaching wrought iron carrier as a magnet, each in turn sucking it along. The carrier by means of its wheels automatically cuts into circuit those helices immediately in front and cuts out of circuit those which it has passed, thereby saving the energy that would be wasted should all the helices be kept constantly in circuit.

The track used in the experiments at Dorchester was such as to make very high speeds impossible, but from those experiments it is supposed that there would be little trouble on a properly constructed track in obtaining speeds of 150 to 200 miles an hour should it be necessary, but for short distances such high speeds would be undesirable. The economy of the system has yet to be proved, but from the accompanying cut the simplicity of the apparatus will be seen. The electric pressure employed would depend upon the distance between generating stations; for such work as that proposed for New York it need not be greater than commonly used for traction or lighting in cities at the present time.

The Interstate Commerce Commission and Its Work.

BY HON. AUGUSTUS SCHOONMAKER, Formerly Interstate Commerce Commissioner.

SECOND PAPER.

[This admirable and useful summary of the work of the Interstate Commerce Commission has been prepared by Judge Schoonmaker at our request. The limits of space which we set have made it necessary to condense the matter very closely, and doubtless many will regret that various cases have not been amplified; but we wish to give in as compact form as possible a summary of the questions that have been passed on and the principle or precedents that have been established. The first of these papers appeared in the *Railroad Gazette*, Oct. 16, p. 725.—EDITOR.]

A carrier cannot discriminate in its own interest.—When the law took effect there were instances in which carriers made rates intended to be for their own interests and prejudicial to shippers. One of these was railroad ties, for which carriers have large use themselves. Rates were made so high as practically to prohibit shipments, and force a sale to the initial carrier. One of the early cases before the Commission was of this character. The Commission ruled that a common carrier cannot establish rates with the view to retain upon its own line material for which it has use, or to keep the price low for its own advantage, but that as a public servant its rates must be reasonable and just from the shipper's standpoint as well as its own.—*Reynolds vs. Western N. Y. & Penn. R. R. Co.*, 1 I. C. C. Rep., 393.

Discrimination on the ground of color unlawful.—In several cases arising in the Southern States, complaints were presented that discriminations were made against colored passengers who paid the same rates of fare as white passengers, in respect to accommodations and comforts in cars. The rule laid down by the Commission in all these cases was that passengers who pay the same fare must have equal accommodations and treatment in all respects, without distinction in regard to color, and that if it was not desirable that persons of both colors should travel in the same car, separate cars with equal accommodations must be provided.—*Council vs. West. & Atlantic R. R. Co.*, 1 I. C. C. Rep., 399; *Heard vs. Georgia R. R. Co.*, 1 I. C. C. Rep., 428; *ame vs. Same*, 3 I. C. C. Rep., 111.

Foreign carriers subject to the law.—The important question whether foreign carriers are subject to the law when they engage in transportation within the jurisdic-

tion of the United States, was presented for formal decision. The Commission ruled that the provisions of the Act to regulate commerce apply to foreign as well as domestic common carriers engaged in the transportation of passengers or property, for a continuous carriage or shipment, from a place in the United States to a place in an adjacent foreign country, and that they must comply with the provisions of the Act in respect to the printing of schedules of rates, fares, and charges for the traffic they carry, the posting and filing with the Commission of copies of such schedules, the notice of advances and reductions, and the maintenance of the rates, fares and charges established and in force; and are also subject to the provisions of the Act in respect to joint tariffs of rates, fares and charges for continuous lines or routes.—*Matter of Grand Trunk Ry.*, 3 I. C. C. Rep., 89.

A Railroad company not obliged to accept and haul private cars, or cars of private car companies.—A railroad company being responsible to the public for the safety, suitability and sufficiency of its car equipment, may acquire its cars by construction, by purchase, or by contract for their use, and no one has power to compel a railroad to select among these several modes, or to contract with all comers. And the tracks of a railroad company are not a common highway upon which anyone can enter and use his own cars, against the objection of the company owning the tracks. The right to construct and operate a railroad, unless the contrary is expressed in its charter, is a franchise exclusive in its nature, and is not held in common with the public.

It was ruled, therefore, that a railroad company operating its line of road with ample equipment provided by itself, could not be compelled to haul an excursion passenger car belonging to a private car company.—*Worcester Excursion Car Co. vs. Penna. R. R. Co.*, 3 I. C. C. Rep., 577.

Payment of commissions to ticket agents.—It is reasonable and therefore lawful for a railroad company to adopt a regulation that it will not sell tickets for and

over the line of a connecting road unless such connecting road will abstain and agree to abstain from paying commissions to the agents of the initial road on the sales made. A connecting road has no right to subsidize agents of other roads to acquire business for itself. The provision of the Act to regulate commerce that common carriers shall "afford all reasonable, proper, and equal facilities for the interchange of traffic between their respective lines, and for the receiving, forwarding and delivering of passengers and property to and from their several lines and those connecting therewith," does not require a railroad company to sell through tickets over the line of a road whose managers persist in interfering with its subordinates by offering commissions to the agents who sell such tickets.—Chicago & Alton R. R. Co. and others vs. Penna. R. R. Co. and others, 1 I. C. C. Rep., 86.

Contracts between railroad companies for use of tracks.—A railroad company may, in the absence of statutory provisions to the contrary, contract with another railroad company for a running privilege over a portion of its tracks, and may restrict the lessee company from accepting or delivering traffic on the tracks of the lessor company. In such a case the rights of the lessee company are measured by the terms of the contract in respect to the extent of the use of the tracks of the lessor company, and the provisions of the act to regulate commerce apply to the situation created by the contract, and add no authority for a different use of the tracks. The lessee company cannot be compelled to act as a common carrier beyond the privileges conferred by the agreement.—Alford vs. Chic. & R. I. R. R. Co., 3 I. C. C. Rep., 519.

Effect of stoppage in transit on through rates.—When property is billed from one station to another with the understanding that it is to be unloaded at an intermediate station, for the purpose of trying the market at such station, and that whether it shall be reloaded for further carriage will depend upon the volition of the shipper or of anyone who may have become purchaser, the case does not fall within the reasons governing rates on through transportation, and the carrier is not, at such intermediate points, entitled to have the carriage of the freight, so unloaded, protected as a through shipment over the residue of its own line as against competitors. Chic., R. I. & Pac. Ry. Co. vs. Chic. & Alton R. R. Co., 3 I. C. C. Rep., 450.

Terminal facilities. Charges for their use.—It is part of the duty of common carriers to provide adequate terminal facilities for receiving and delivering property carried. This duty is not fully performed when access to a depot must be purchased for the property transported. When a carrier of live stock gives to a stock yard company an exclusive right to handle the stock carried, with the privilege of making a charge to the shipper for yardage, and a shipper has conveniences of his own adjacent to the tracks of the carrier which he demands the right to use for himself and his customers, the carrier must comply with his demands. Keith vs. Ky. Central R. R. Co. and others, 1 I. C. C. Rep., 180.

Terminal facilities. Free cartage.—Where a carrier subject to the act has established and published its schedule of rates and charges for a station on its line, the performance of an additional service for shippers, in the form of free cartage furnished by the carrier for the collection and delivery of freight carried on its road, to or from such station, operates as a reduction or rebate from the schedule charge, and is unlawful. If free cartage at a station has the effect to reduce a rate below the charge at another station nearer the point of shipment, it is unlawful as a less charge for a longer distance, in violation of the fourth section. Stone & Carten vs. Detroit, Grd. Hav. & Mil. R. R. Co., 3 I. C. C. Rep., 613.

Relative rates on competitive traffic.—Rates on competitive traffic shipped to or from competing localities must be relatively reasonable, and carriers cannot arbitrarily select particular articles of such traffic and materially raise or lower rates on them without violating the statute.

Live hogs and hog products as articles of commerce are in direct competition with each other, and a higher rate on live hogs than on their products is undue prejudice and disadvantage condemned by the Act. Board of Trade of Chicago vs. Chic. & Alton R. R. Co. and others, 4 I. C. C. Rep., 158.

The same principle applied to live hogs, live cattle, and their dressed products, with the addition that relatively reasonable rates must be proportioned to the cost of service respectively. Squire & Co. vs. Mich. Cent. R. R. Co. and others, 4 I. C. C. Rep., 611.

TO BE CONTINUED.

Unlocking Gear for Drexel Coupler.

The new unlocking gear for the Drexel coupler is shown by the accompanying illustration. The operation is as follows: The vertical handle shown at the side of the car is connected to the lock by means of a rod and link chain, as shown. To unlock the coupler the handle is pulled outward. The first part of the movement unlocks the coupler; the end of the movement pulls the knuckle open. Provision is made for holding the lock in the unlocked position by hooking the lever behind a projection on the lever hanger.

One advantage claimed for this style of lock is that the

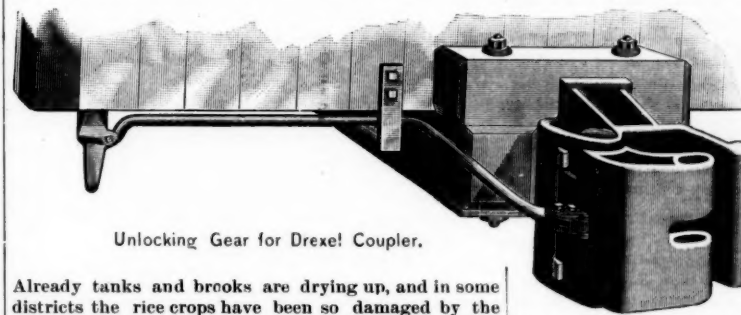
unlocking gear is carried by the coupler itself and is always in a proper position for use, and if the coupler be displaced by the breaking of the draft rigging or by the draft springs taking a set, the unlocking gear will yet be operative.

It will be noticed that near the point where the unlocking rod projects from under the end sill it is supported by a heavy stirrup which has a double office—one to hold the unlocking rod, and the other to prevent a movement of the unlocking rod in case the coupler is pulled out of its fastenings. The rod being held by the stirrup when the coupler is moved outward causes the coupler to be unlocked, and thus it is prevented from being pulled farther out and falling on the track. This unlocking gear is now in use on 12 different railroads.

Indian Railroad Notes.

The present year bids fair to uphold the reputation I gave it in my last letter of being one of the most remarkable on record. Although the rainy season proper commenced much later than usual, some parts of the country had more rain than they required in a very short time, and both the Indian Midland and the Bombay, Baroda & Central India railroads were badly breached in many places, the train service on the last mentioned line being entirely suspended for nearly a fortnight. On July 29 14 in. of rain fell at Surat during the 24 hours and at Broach 11 in. fell in 7 hours. At the town of Mahuva (Bhavnagar State), on the west coast, 15 in. of rain fell during 24 hours and the streets were breast high in water. Hundreds of houses were carried away and 300 persons were drowned. The Suid-Pishin railroad was also breached in several places, and the G. I. P. R. gave way near Nursingpur, thus causing much delay to both mails and passengers.

Some parts of Bengal and the northwestern provinces are still crying out for rain, and unless there is a heavy downpour before next hot season water will be scarce.



Unlocking Gear for Drexel Coupler.

Already tanks and brooks are drying up, and in some districts the rice crops have been so damaged by the drought that the yield will be from 50 to 75 per cent. less than usual. On the other hand the rice crops in Lower and Eastern Bengal have been ruined by too much rain. The tea industry in the Doonars and the Darjeeling Terai has also suffered for want of rain. Madras was in a bad way for some time, but during the end of September and early part of October, when the rainy season was supposed to be over, the downpour was so heavy that bridges were swept away and the lowlands flooded.

The Madras government has been making experiments with dynamite with the object of producing rain at will. Ten packages, weighing 10 lbs. each, of dynamite were placed on a ridge of rocks standing 2,400 ft. above sea level and about 200 ft. above the surrounding plain. The charges were placed from 40 to 60 yds. apart, and exploded with fuses at intervals of one minute. Within six hours a magnificent shower of rain fell which lasted half an hour. There was no wind or thunder and the area over which rain fell was about 30 square miles.

The Indian government has sanctioned an expenditure of considerable money for more rolling stock to meet the abnormal rush of traffic on the Northwestern Railway. During the past season the wheat traffic from the Punjab to Kurrachee has been very heavy, and there is still a large quantity of grain in the country.

The third annual meeting of the Committee of Locomotive and Carriage Superintendents will be held shortly, and the possibility of increasing the carrying capacity of wagons, without increasing the dead weight, will be one of the subjects discussed. A gentleman interested in the manufacture of "tube frame" wagons will visit all the principal railroads in India during this cold season, and hopes to receive large orders for this type of rolling stock.

Mr. Horace Bell, C. E., who is now Consulting Engineer to Government for the E. I. R., and other Bengal railroads, advocates a reduction in third-class fares, and in doing so points out that the average cost of hauling a passenger one mile—including all classes—is three-quarters of a pie, while the average sum received from the passengers is 2½ pie. He is of opinion that if the fare was reduced to 1½ pie per mile a large number of those who now travel on foot would use the railroad, and thus both the public and the railroads would benefit. The fare for third-class passengers at present is 2½ pies per mile, or say 20 miles for four annas, equal, at the present rate of exchange, to four pence halfpenny. This is cheap traveling, no doubt, but

* At the present rate of exchange, a rupee, although nominally worth two shillings, is really worth one shilling and five pence. One pie = 1/3 rupee.

native travelers are satisfied with a low rate of speed, and require very little in the way of comfort, and it must be borne in mind that the wages of farin laborers average less than Rs. 4 per month, and on this families of six or seven have to subsist, leaving very little for traveling or other expenses.

Water supply schemes are being brought forward in all parts of the country, and certainly not before they were needed. The average native is quite content with water from an unlined well, into which all the filth from houses, latrines and cattle sheds runs, and this is the cause of half the fever and cholera. A few years ago it would have been considered sacrilege to filter, or attempt to improve in any way, water drawn from the holy Ganges, but the Government have managed to enlist the leading natives, both Hindoos and Mahometans, on their side, and the good work is progressing.

One of the worst railroad accidents that has ever happened in this country took place on the G. I. P. Railroad on the 5th. The up passenger train from Bhowwaul to Nagpur was running at about 40 miles per hour, when the tire of the right hand leading wheel broke, and the whole train was precipitated down the embankment. The train was a heavy one, drawn by two engines, and contained Sir George Greaves, Commander in Chief of the Bombay Army, and his staff, as well as several cars of European soldiers, in addition to a large number of ordinary passengers. Sir George and his staff had a marvelous escape, the body of the carriage in which they were traveling being torn from the underframe, but the others did not fare so well, six soldiers being killed on the spot, and 24 others badly hurt, of whom six have since died, making the total number 12. The European conductor, and both the engineers and their firemen (these four last were all Parsees) were killed on the spot, and several native passengers were killed, or severely injured. The government inquiry has elicited the following facts:

"The tire of the right front wheel of the engine broke, owing to a covered flaw in the metal. This broke the rail, and a derailment ensued. The tires of the leading engine were old, and had been packed with iron washers, as is occasionally done in cases of replaced tires. From the evidence of one of the oilers it appears that the driver did not inspect his wheels at the last stopping place." The opinion is that the tires were old and worn,

and the metal flawed, but no criminal neglect can be imputed to the company or to its servants, as the flaw was imperceptible from outside, and the wheels though old were serviceable.

A large number of new railroad projects are on the tapis, and the good results recorded on the principal lines during the past nine months has encouraged both the government and investors to be more liberal with their money. The Khojak Tunnel has been completed, but a large amount of money will still have to be spent on the Frontier Railroad before it can be depended upon at all seasons of the year. It is proposed to construct a line from Peshawur to Michor this cold season as the first installment of a Kabul river railroad. The Attock-Mare Railroad, on the left bank of the Indus, will be 104 miles long, and is estimated to cost 164 lakhs of rupees. Sir Edward Watkin's scheme to connect the different metre gauge systems by laying a third rail on the intervening broad gauge roads is not looked upon with much favor, and it could not be done so easily as he thinks, owing to many of the broad gauge lines being laid with metal ties, rendering the fixing of a third rail impossible unless extra ties are used. The Assam Chittagong Railroad has been started at last, and will at present remain in the hands of Government. Recent events in Manipur and Burmah have shown clearly that the means of communication between Calcutta and outlying districts should be improved at once. The Kashmir Railroad will not be commenced for some months, as the Government appear to be in doubt as to which of the many proposed routes is the best. It is a pity that so much time is wasted in cases where a fair return on the capital is certain, especially as it would save long marches over difficult country whenever a column of troops have to be sent to the Black Mountain, and this is almost a yearly occurrence.

The occupation of the Pamirs, by Russian troops, has placed the Indian government on the *qui-vive*, and at Chaman, which is 72 miles from Kandahar, everything is in readiness for completing the railroad to Kandahar whenever such a step is considered necessary.

The Mu Valley Railroad, in upper Burmah, is to be opened for traffic as far as Kawnlin by the end of March next. There has been a good deal of distress in some parts of Burmah owing to the crops failing, and relief works are still in progress.

There has been considerable discussion about the new docks at Kidderpur, which will be ready for vessels of all sizes before the heavy wheat traffic commences again. The principal exporters declare that they will not use the docks if by doing so any additional expenses is to

be incurred, but the Port Commissioners are quite willing to make any concession in their power, and arrangements satisfactory to all concerned will no doubt be made before long.

The standard type of double headed rail, weighing 75 lbs. to the yard, does not give satisfaction and several different sections have been proposed. A few engineers are in favor of flat-footed rails, but the majority prefer bull-headed rails, with a much flatter top than any now in use. Deodar (Indian fir) ties are being largely used on many railroads, and some managers consider them cheaper than metal ties at present prices. If some good preservative were used, and bearings, or tie-plates of a suitable pattern, introduced, they would no doubt give as good results as any other soft wood ties; but wood preserving is in its infancy so far as India is concerned, although all the imported ties of Baltic fir are creosoted before being shipped. The heat causes the creosote to exude both on the voyage out and while they are being used, and probably the zinc-tannin or vulcanizing processes would suit India better, if some one would only make a start with them.

The Indian Government have at length decided to allow local firms to tender for ironwork, such as girders, roofs, etc., but in each case they require proof that the parties who tender have the proper machinery for constructing the work and testing it when completed. There is really no reason why India should import metal ties, joint plates, track bolts, spikes, chairs, or in fact any permanent way fittings, with the exception of rails, and even these might be rolled a few years hence if the Government would only guarantee regular work to respectable local firms. Within a year or two the leading railroads will commence building their own locomotive boilers and frames, and the only parts imported will be the axles and wheels, which can still be purchased in England at a lower rate than they can be made in India. The unfavorable rate of exchange adds so much to the cost of all imported material that all interested in the country should endeavor to develop local manufactures. Another point that should not be lost sight of is that the prices would go up at least 50 per cent. in the event of a European war, for it may be taken for granted that some one would accidentally sink a steamer or two in the Suez Canal, and thus stop all traffic by the shortest route.

NUT LOCK.

CALCUTTA, Nov. 15, 1891.

Variation of Lead of Steam Valves with Loading in High Speed Stationary Engines.

Among the topical questions discussed at the recent meeting of the American Society of Mechanical Engineers was the following: "Is it better or not to have the lead increase with the load in high speed automatic engines, and if so, why?" The two following arguments were presented, the first by Mr. W. O. Weber, accompanied by indicator diagrams, and the second by Mr. E. J. Armstrong.

BY MR. WEBER.

I think it is better to have the lead increased with the load, for the reason that the impulse necessary to keep up the momentum with the heavier load should be greater at the starting point than with the light load; and in support of this would submit indicator diagrams taken from engine No. 190, which had an increasing lead, and gave very close regulation; also diagrams from engine No. 179, by Edison autograph recording apparatus, showing a regulation under different loads, with the lead increasing with the load; and also diagram from engine No. 189, from the same instrument, showing the lead remaining constant, and having no reference to the load. In other words, I have found the regulation to be more constant, and the general performance of the engine better, under careful tests, with the increasing lead in proportion to the load. These diagrams practically answer query No. 100, as to the advantages to be claimed for a minimum amount of back pressure and a high compression line, as you will see by the diagrams that the compression line is higher; and although no atmospheric line is shown on these cards, it will be noticed there is a slight move upward, showing a varying amount, say two to three pounds back pressure. We think all these points conduce to the proper running of engines, less wear on the reciprocating parts, and greater and better regulation.

BY E. J. ARMSTRONG.

Regarding the query, Is it better or not to have the lead to increase with the load in high speed engines, the writer would take the affirmative, believing that at least with single valve engines the advantages to be gained by such an arrangement are well worth the attention of designers. To summarize the most important considerations:

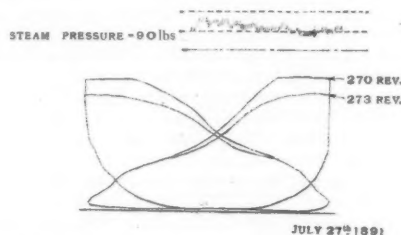
1st. It is an aid to quiet running. At the latest cutoff of a single valve automatic the compression is low and is nearly neutralized by the high terminal pressure on the other side of the piston. With high speeds a sharp lead at this point helps to prevent pounding, and the best amount may be much in excess of that which would be permissible were it to remain constant throughout the governor range. At very early cutoff the compression approaches boiler pressure and the pressure on the other side of the piston is low, so that lead has little effect and may be negative without bad results, in some case with positive gain in smooth running.

2d. It prevents racing. When constant lead is em-

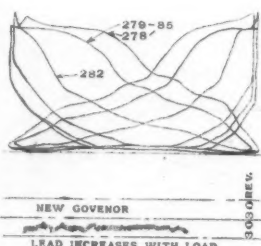
ployed it must be small in amount, as it becomes impossible for the governor to entirely shut off steam. The valve will at least open the amount of the lead, and if this is considerable, the engine will race when running unloaded. Any misadjustment of the valve occurring by wear or other use will also cause racing, by admitting steam to one end of the cylinder. A negative lead at early cutoff removes trouble from this source and by enabling the governor to entirely shut off steam gives it better control of the engine.

3d. It makes it easier to obtain good governing. Apart from giving the governor better control there is an advantage in that the centre of the eccentric does not have to shift through so great a distance, consequently the governor may have greater leverage over the eccentric and as a result greater stability.

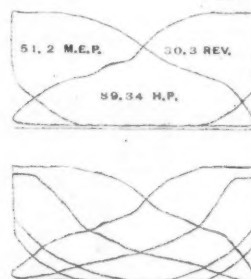
4th. It tends to equalize the compression and the exhaust opening: the angular advance of the eccentric being slightly greater at late cutoff than with constant lead, the exhaust closes earlier and the compression is a little higher. At early cutoff the angular advance is very much less than with constant lead, and the exhaust



Card No. 1,466; 11 in. x 12 in. Automatic Engine No. 181; Erie City Iron Works.



Card No. 1,783; 11 in. x 12 in. Automatic Engine No. 179.



Card No. 1,830; 11 in. x 12 in. Automatic Engine No. 190; 100 lbs. steam pressure; lead changes with load.

closing later the compression does not run nearly so high. The exhaust does not open so prematurely at early cutoff as with constant lead and opens earlier at late cutoff. The most marked effect on the cards is the more nearly equal compression, which by permitting less clearance should be conducive to economy. At early cutoff the steam line is a little lower and slopes off to the expansion curve a little more. Though this does not produce so pretty a card, it is an open question whether it is bad or not. At early cutoff there is so much difference between the water consumption as shown by the card and by the meter that the cylinder condensation must be very great. Possibly the slight wire drawing may reduce this enough to balance the loss in card area.

English Train Accidents for the Second Quarter 1891.

The British Board of Trade report, giving the statistics of railroad accidents for the six months, and the special inquiries for the three months, ending June 30, shows seven employes and no passengers killed, and 70 employes and 347 passengers injured by train accidents. Only ten accidents were made the subject of special inquiries. We condense the more interesting cases.

On the Metropolitan (London), June 4, a passenger train, stalled in a tunnel near Marlborough Road, was run into at the rear by a following passenger train, several trainmen being injured. The foremost train had a new engine, which was unable to pull its train up the grade of 88 ft. per mile in consequence of a defect in the construction of the sanding apparatus. The delivery holes were too small, and the rod did not pass through the sand so as to properly stir it up. The train had been standing not more than two or three minutes, but before the expiration of that time the block signal operator, under the impression that he had received "line clear" from the next station, admitted the following train. The rule requires that when an operator receives the signal "line clear" he must move a disc and insert a peg to hold it in position; but the inspector finds that this rule is commonly disregarded where trains are very frequent. Prompt measures should be taken, he says, to see that this is not suffered to continue. The operator who admitted the second train seems to have had some misgivings, for he asked the other officer through the telephone if he had signaled the train forward; but he

did not say what train he referred to, so the other man assumed that the first one was meant, and replied "yes." The air in the tunnel at the point where the train was stalled was so foul that the men on the engine were half stupefied. Several of the lamps also went out. Regarding the question of flagging, General Hutchinson says: "As the train must have stopped, at the very least, two minutes, but more probably three minutes, before the collision occurred, there is no doubt but that Falkus, the rear guard, had time to go sufficiently far back to protect his train, and prevent the collision, had he lost no time in doing so when the train had stopped. But considering the uncertainty at first as to whether the train might not again at once go forward, and that the state of the atmosphere in the tunnel made it hard to realize the actual state of things, I do not think much blame can be attached to Falkus for want of promptitude in complying with the rule as to going back, although it is to be regretted that he had not been rather more on the alert." The inspector says that if the engine had been first tried on a freight train up this grade the fault of the sanding apparatus would probably have been discovered. Electric locking from one block station to another is in use on the Metropolitan road, but the appliances had not been completed at this point on account of contemplated alterations. They were, however, put in use ten days after the collision.

On the Londonderry & Lough Swilly, at Springtown, Ireland, June 21, there was a butting collision between a train load of soldiers and an empty passenger train, injuring 14 soldiers and killing the engineer and fireman of the empty train. The empty train had been ordered to wait at a certain station for two specials, but when the conductor of the first, on passing, called out "You are to go on to Londonderry," the engineer and guard deliberately disregarded their written instructions and started out. The signalman, who received a copy of the same order, is blamed for setting a switch to let the train out. This man declared on the trial that he was unable to read the order, and it appears that he is very illiterate. The collision would doubtless have been prevented had the trains been properly fitted with continuous brakes. The new law compelling the use of continuous brakes does not apply to this company until May 29, 1893. The collision, it will be seen, was the result of great carelessness and laxity of discipline, and the chief censure of the inspector is based on the written agreement that the company made in 1887 to use the staff system here, which agreement seems to have been constantly ignored. This was doubtless due to increased traffic, and the inspector says that the company should be compelled to adopt the block system within three months. The conductor of the first special train, whose remark led to the blunder, was imprisoned for seven months. The guard who ran contrary to orders was found guilty by a court, but has not been sentenced to any imprisonment.

At Bellgrove, on the City of Glasgow Union Railroad, May 26, about 11 p. m., a cattle train, which tried to get into a siding too short for it, was run into by a passenger train, injuring two passengers. The signal man is blamed for setting the switch and giving the signal before he certainly knew that the cattle train was clear, and the guard of the latter is censured for not having taken better precautions. He heard the switch move, and suspected that something was wrong, but did not act with alertness. The Board of Trade requires that in block signaling a train shall not be allowed to run from one station to another until the track is clear, not only to the latter station but through it—that is, not until both home and starting signals are clear; and it appears that this rule is commonly disregarded at this place, which leads Major Marindin to remark that the block working is carried on in a slovenly manner. If the block section is too long, there is "no reason whatever" why a block cabin should not be erected at Duke street, an intermediate station.

At Airth Road, on the Caledonian Railway, May 7, there was a collision of passenger trains, due to an engineer running past a distant and a home signal, both against him; but the collision was contributed to by the loose practice of the signalman at the last preceding station, who, to get this train out of the way of others, allowed it to pass the home signal with the intention of stopping it by a hand signal before it got out of his reach. To do this he went to the foot of the stairs of his cabin, but failed to attract the runner's attention. Major Marindin says he would have done much better if he had shown a flag from his upper window. This allowing a train to pass a signal to enter a block section when the rules do not permit the passage of the train through the section appears to be common practice here; but it will be seen that, notwithstanding the rules, there was no danger in admitting the train to the section except on the assumption that two positive signals are required to stop a train. The Board of Trade regulations, however, are based on this assumption, as noted in the case of the Bellgrove collision just mentioned. The inspector's conclusions in this case included a recommendation for the removal of the cabin to a better location and the erection of a starting signal at the point where the signalman tried to control the train by hand signals.

A Step Toward Elevated Terminals in Chicago.

Within the last few days the Chicago Elevated Terminal Railway Company, through its President, General Joseph T. Torrence, has taken a most important step toward improving terminal facilities. It consists in the purchase, or, what amounts to the purchase, of the entire terminals, tracks, buildings and property owned by the Atchison, Topeka & Santa Fe in Chicago. The value of the property is estimated to be between \$5,000,000 and \$8,000,000.

The plan is as follows: Terminal facilities on elevated structures are to be furnished for the trunk lines entering Chicago, but the names of the roads that have signified their intention to make arrangements for using these facilities will not be made public at present. Accommodations will be built for ten trunk lines from any part of the city limits. There will be one branch running south, one southeast and one to the southwest. The terminals will be at the corner of State and Twelfth streets, where a magnificent passenger station will be built with ten or twelve tracks inside. In the large tower there will be offices for the roads using the terminal and halls for traffic associations, etc. Not a single railroad company is interested in this enterprise, as it is believed that it is best to keep the terminal entirely free from any possible accusation of favoritism.

The viaduct structure will be of steel and iron plate girders, and stone and brick arches over the alleys. There will be 16 feet clear height above the curb line. The rails are to be 100 lbs. to the yard, laid on sawed creosoted ties with large tie plates. The best types of block signals and interlocking will be used on the entire terminal.

The freight storage will be enormous and will be equipped with hydraulic transfers, capstans and elevators, as now used in London and Paris. These freight houses will be from 6 to 8 stories high and will be equipped with 100-ton hydraulic elevators of such size as to take loaded freight cars of the largest size to any part of the building. The entire lower stories of the freight houses will be used for cold storage, of which there is needed in Chicago more than ten times what is now available. Each road will be provided with a freight house for its own use, and yards for passenger and freight cars. Through freight will not enter the city and outside yards will be established for the transfer of freight beyond the city limits.

Passenger stations will be built on every half mile of line, and at all important points hydraulic elevators will be used to lift the passengers to the platforms just before the train leaves the station. Suburban traffic may be carried on by any road using the terminal where the traffic originates 10 miles from the point of entering the terminal.

The advantages to the city are about as follows: The cost of handling freight within the city limits to wholesalers and consumers will be about 50 per cent. less than at present, as has been found in Europe where this system has been introduced. The streets of the city will be restored to the uses for which they were intended; this is in accordance with a recent decision of the Supreme Courts of Illinois that railroads have no right to occupy the public highways and streets as they are now doing in Chicago. It is estimated that a complete system of elevated terminals will save the lives of about 400 persons per year, and more than 800 cases of serious injuries. Within the city limits trains can run at 50 miles an hour instead of six, as the ordinance now requires for surface roads.

This step is believed by those who are well informed to be an important advantage to the Atchison, as it will be relieved of enormous holdings within the city limits, and will receive a profit on the original outlay for the property sold. If this plan, which is receiving public support of the best kind, is carried out, it will simplify many perplexing terminal problems which are now occupying the minds of the directors of roads entering the city.

THE SCRAP HEAP.**Notes.**

The lining of a tunnel on the Louisville, Evansville & St. Louis caught fire on Dec. 2, and interrupted traffic for over a week, it being impossible to subdue the flames, owing to lack of water.

At Jefferson City, Mo., Dec. 12, James G. Smith was sentenced to seven years' imprisonment for complicity in wrecking a passenger train on the Missouri Pacific near Ottumwa on Aug. 7, 1890.

The Rome, Watertown & Ogdensburg and the Central Vermont will build an elevator at Norwood, N. Y., for the storage of grain going to New England points, which often has to be held considerable periods for orders.

The custom of carrying stockholders to the annual meeting of a railroad free, which has been in vogue on the Central of Georgia for about 15 years, and which seems to be as popular there as in other parts of the country, has been abolished by the new management of the road, causing much comment in the newspapers.

Thirty station telegraph operators on the line of the Southern Pacific, in Arizona and New Mexico, struck and left work Dec. 9, complaining that the company compelled them to sign an agreement not to belong to the Order of Railway Telegraphers. It is now reported that the company has secured other men in their places.

The Harris property at St. John, N. B., on which there are now the large foundry and car works of James Harris & Co., has been purchased, it is reported, by the Government for the Intercolonial Railroad. This property is close to the station buildings and the railroad has been cramped for room for years past. The price paid is \$300,000.

The United States Supreme Court has decided that a tax levied by the State of Maine on the gross receipts of the Grand Trunk, of Canada, for the privilege of exercising its franchises within the state of Maine, was legal and constitutional and not contrary to the provision of the Constitution prohibiting the states from regulating interstate commerce. Four justices dissented and five signed the opinion.

The Pennsylvania and the Atlantic Coast Line will put in service Jan. 4 an additional fast train to Florida, leaving New York at 9:30 A. M., Washington 4 P. M., and arriving at Jacksonville at 7 P. M. next day. This train will be daily, except Sundays. On Jan. 18 the New York and Florida vestibule limited express, leaving New York tri-weekly, and running direct to St. Augustine, will be put on.

A contract made by the Chicago & Alton with the Wiggins Ferry Co. in 1884 for the transfer of freight and passengers across the river at St. Louis has been the subject of litigation for many years, the road backing out after the completion of the bridge, and a decision has lately been rendered awarding the ferry company \$378,000 damages. It appears that about \$123,000 was paid by the Alton in settlement of one suit several years ago. The present decision will doubtless be appealed from, so that the actual payment of the sum named will not take place for a good while yet.

The Home Insurance Co., of New York, last week cancelled a large number of its policies insuring railroad property against fire. This action was taken on the shortest notice possible under the conditions of the policy and aroused much comment among insurance men. A number of companies pool their losses on this class of insurance and all are interested. One explanation is that the business has been done at a serious loss for sometime, and another that numerous fires in cotton warehouses on the Southern roads have alarmed the insurance companies. The movement of cotton has been very heavy for several weeks and large quantities of it are exposed.

Twelve railroad commissioners from the various New England States held a consultation at Boston last week, by invitation of the Massachusetts Commissioners, regarding the best manner of securing harmony in railroad legislation in the several states. It is understood that car heating and the use of safety appliances on freight and passenger trains were the main topics discussed. The gentlemen present were: Samuel E. Pingree, of Vermont; D. N. Morland, A. W. Wildes and Roscoe Bowers, of Maine; H. M. Putney and B. F. Prescott, of New Hampshire; E. L. Freeman, of Rhode Island; George M. Woodruff, William H. Hayward and William O. Seymour, of Connecticut; George G. Crocker and Everett A. Stevens, of Massachusetts.

The Colorado Bureau of Labor statistics has published some statistics of railroad labor in that state. There are 4,546.61 miles of road in the state, the assessed valuation of which is \$30,350,161. There are 13,252 persons employed in various occupations incidental to railroad service, who receive \$10,528,870 yearly. The average monthly wages paid are: Engineers, \$120 to \$150; firemen, \$75 to \$95; conductors, passenger, \$100 to \$120; freight, \$85 to \$100; brakemen, \$68 to \$95; dispatchers, \$105 to \$125; operators, \$50 to \$80; station agents, largest stations, \$125 to \$175; smaller, \$40 to \$80. Clerical labor is from \$50 to \$150 per month, and is the poorest paid in the railroad service. This is said to be on account of the great number of clerks who come to Colorado for their health, and in order to secure positions work for barely enough to live on.

United States Senator Frye of Maine has reintroduced, with a number of amendments, the bill reported by him March 2 last from the Select Committee on Pacific Railroads, providing for the refunding of the debt of the Pacific railroads. The greater portion of these amendments are changes proposed in the dates in the bill to make it effective next year. One amendment provides that the present worth of the amounts of the indebtedness of the aided roads and the amounts paid thereon shall be computed on the basis that money is worth 2 per cent. per annum instead of 2½ per cent. Another amendment to the section relative to the method of computing the indebtedness proposes that to the total amounts remaining unpaid after deducting the sinking funds applicable to the companies, there is to be added a sum computed on such basis, assuming money to be worth 2 per cent., as to represent the capitalized present worth of a rebate of interest for 10 years of 1 per cent. on the total unpaid amounts and on the sum so added for rebate of interest.

Foreign Notes.

One of the German papers recently gave a brief outline of the history of the Prussian railroads, showing, among other things, the gradually growing extent of government control of the systems. From this it appears that since 1872 the total length of lines which passed into the government's hands amounted to 14,180.70 kilometers, or about 8,812 miles.

The Russian Steam Navigation Co. has erected in one of the suburbs of Odessa, a special station for the storage of large quantities of petroleum, large iron tanks of the gasometer pattern having been built for the purpose. Seven of these tanks have already been completed, and an eighth, to have a capacity of 200,000 poods (about 7,225,000 lbs.), is now in course of construction. The combined capacity of the eight tanks will be 1,120,000 poods (about 40,500,000 lbs.). The station is provided with a heavy iron charging main and a powerful steam pump. A flexible tube connection is lowered into the holds of the trade steamers which bring the petroleum into the port and the oil is pumped direct from the steamers into the storage tanks, the whole operation for each vessel taking only a few hours. The method is rapid and convenient, and the transfer of the oil is accomplished with a minimum amount of danger.

The Egyptian railroad administration has been compelled by the increase in traffic to build a second bridge across the Nile at Benha. A few years ago most of the railroad contracts in Egypt were taken by English firms, but these have been almost completely superseded in that market by their Continental competitors.

Bonds Listed on the New York Stock Exchange.

The Governing Committee of the New York Stock Exchange listed this week the following securities:

Long Island Railroad additional issue of general mortgage four per cent. gold bonds, \$500,000, making total amount listed \$3,000,000.

Hannibal & St. Joseph additional issue of consolidated mortgage six per cent. bonds, \$142,000, making total amount listed \$7,407,000.

Nashville, Chattanooga & St. Louis additional issue of first consolidated mortgage five per cent. gold bonds, \$347,000, making the total amount listed \$3,347,000.

Rome, Watertown & Ogdensburg guaranteed five per cent second mortgage gold bonds, issued on the property of the Oswego & Rome Railroad Co., \$400,000; also guaranteed gold 4s, issued on the property of the Utica & Black River Railroad Co., \$1,300,000.

Lehigh Valley Terminal first mortgage five per cent. gold bonds, \$7,000,000.

Pig Iron Production for Five Months.

The *American Manufacturer's* return of the weekly capacity of furnaces in blast shows a production of 193,000 gross tons for the week ending Nov. 1. This makes the approximate production for a month 820,367 gross tons. As will be remembered, our production for the first half of this year was only 3,371,925 gross tons, against 4,615,837 tons in 1890. Since that our production has been larger than last year, as will be seen by the approximate monthly productions given below:

	1890.	1891.
July.....	739,238	752,257
August.....	712,338	707,818
September.....	739,643	763,946
October.....	791,282	827,437
November.....	775,515	820,367
Five months.....	3,777,953	3,940,805

This makes the total production up to the first of this month 7,312,730 tons as against 8,363,790 tons last year. The papers directly connected with the iron trade have since August been warning their readers against the steadily increasing production, a warning that seems to have been justified by a decline in price, but as will be noticed without any effect on the production. Now that the railroad companies have commenced ordering cars and buying rails, it is possible that we shall not see any month for over a year in which the production will be less than 800,000 tons, and it may go to one million tons, which could be accomplished by putting in operation one half the furnaces now out of blast. This may not occur, but unless there is some unforeseen cause for depression it is probable our make for 1892 will reach ten million gross tons.

Railroad Disaster in Russia.

Later particulars of the derailment on the Orel-Griasi Railroad in Russia, Nov. 24 (reported in the *Railroad Gazette* of Dec. 4), show that the disaster was a terrible one. The train, which was a long one, made up of passenger and freight cars, was on the way from Orel to Griasi, when one passenger car ran off the track owing to the breaking of a tire. The train was traveling very fast at the time, and the car was dragged along with the rest to the river Optukha, and as it was crossing the bridge the car at length overturned, and falling against the parapet, which broke down under the shock, was precipitated into the frozen river. Four more cars were dragged down with it, but the breaking of the couplings saved the rest of the train. The weight of the falling cars broke the ice with which the river was thickly covered, and four of them disappeared beneath the frozen surface. The fifth fell on the top of the others, and, turning over, remained supported on the wreckage, being only partially submerged. It was from this car alone that any persons were recovered alive. The total number of passengers who were drowned was still uncertain at latest reports, but must have been very large.

Creosoting Works Burned.

The works of the Eppinger & Russell Creosoting Company, Long Island City, were burned down Dec. 10. The works employed 200 men. The loss was estimated by George S. Valentine, the Superintendent, at over \$50,000; covered by insurance. The works were running night and day.

Bridges over Navigable Streams.

There has been constantly growing trouble between the bridges over the Chicago River, the owners of dock property adjacent and the owners of the large boats. The bridges swing on central piers and vessels at the docks near the bridges obstruct the waterway where it is narrowed by the bridge pier; the result is detention of vessels passing up or down the river. The dock owners claim an unobstructed and continuous use of this property, and have refused to move vessels which were loading or unloading, and the question, whether the boats at the docks or the piers in the river were the obstruction to navigation has been decided by Captain Marshall, of the U. S. Engineer Corps, to the effect that the boats have a right to continuous use of the docks and the central piers are obstruction. The War Department has endorsed this decision of Captain Marshall, and the Chicago *Inter-Ocean* called attention to the fact that this decision provides in effect that where central piers obstruct narrow channels they must be changed so as to leave a passage for vessels of modern size, or, in other words, if the War Department is sustained, owners of bridges crossing navigable waters of the United States must alter their bridges to meet the changing conditions of commerce caused by the increasing size of vessels. This decision will interest railroads crossing the navigable waters of this country.

Proposed Law on Car Couplers.

Senator Cullom, of Illinois, has introduced a bill in the Senate providing for a uniform standard car coupler. From the telegraphic abstract it appears that the roads will be required to vote for a choice in couplers. Every common carrier is to be entitled to one vote for every freight car owned, leased or controlled, and the employees will be entitled in the aggregate to one-third as many votes as may be cast by all the common carriers, the Interstate Commerce Commission to have the power to decide upon the validity of the votes cast. If not less than 600,000 votes have been cast and the entire vote for any particular coupler is not less than 500,000 the Commission shall certify these facts to the President, who shall issue a proclamation declaring the coupler chosen to be the standard coupler for use in interstate commerce. In case no choice is made, the President shall appoint a Commission of five competent persons to determine the coupler best to be used. All carriers are to equip at least 10 per cent. each year of the number of freight cars used and also to equip every engine with driving wheel brakes. The Commission may extend the time to any particular company within which it shall be required to comply with the provisions of the bill. The Commission shall invite bids from inventors of couplers, stating what they will accept from the United States for their patents, and upon the purchase of the patent by the Government the coupler may be used or manufactured free. The salary of the Commissioners is fixed at \$5,000 a year, and an appropriation of \$70,000 is made to carry out the proposed measure.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in his journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Some years ago alarm was expressed lest the increasing wheat exports from India might deprive our Northwest of a market for its grain. The Indian exports, however, have ceased to grow; the population keeps pace with production, and in none of the last three years have Indian wheat exports reached 30,000,000 bushels, say one-third of the production of the Dakotas this year. The Indian wheat exports are carried chiefly by four railroads, one of which extends from Calcutta northwestward, and the others carry to Bombay and Kurrachee, on the other side of the Peninsula, near the head of the Bay of Bengal. These four railroads carried together 43,875,000 bushels of wheat in 1888, 35,700,000 in 1889 and 34,787,000 last year. These quantities were largely in excess of the exports, which were, from the three ports, 29.6 millions in 1888, 27.6 in 1889 and 25.4 last year. The chief exports now are from Kurrachee, near the mouth of the Indus, which receives from railroads in the Indus valley. It exported 12,400,000 bushels last year, Bombay, 10,500,000, and Calcutta only 2,500,000 bushels. Rates have been made to favor Indian grain exports, the bases of which are different on the different lines, being, for instance, on the East Indian, 1.51 cents per mile for the first 100 miles, 0.778 cent from 100 to 450 miles, and 0.549 cent for distances over 450 miles; on the Northwestern, which now carries most of the export wheat, 1.142, 0.914, 0.778 and 0.594 cent, while reductions from these are made for shipments to Kurrachee; on the Bombay, Baroda & Central India, 0.457 cent is the regular rate for distances over 400 miles, equivalent to 20¢ cents per 100 lbs. from Chicago to New York, which is still considered a low rate here, though the railroads are usually glad to get as much.

It is timely to notice the close relation between car "famines" and repairs. In times like these equipment must be made to do as much work as possible, and this immediately results in a relatively greater number of broken parts, such as sills and drawbars. The repair tracks in the West are now loaded with cars that should be in service. They are out of service because of the breakages of the draft timbers and sills more than for any other cause. If the material taken out of the cars was old and decayed there might be some consolation, but the fact is that the woodwork that is being replaced is often the highest class of timber. It may have been green when it was put in place, but now it is seasoned, and no better wood could be purchased at any price. The repairs simply consist in replacing good material which has been broken by good material which has not been broken. Whenever this

state of affairs exists, it is evident that the material of which the cars are constructed is not used in sufficient quantity or it is not of sufficient strength. Admitting this, then, what is to be done? Evidently the sills must be made of a material or in a way that will enable them to stand the hard service; it is hardly practicable to make them heavier of wood. It is not the severe collisions which break these sills in most cases; it is ordinary service; and while it may be rough service, yet it cannot be avoided. The service, though hard, is compulsory. No engineer can handle a freight train at all times of night and during all kinds of weather, running it off and on sidings, and graduate the shocks of coupling so that they will be within the limit of the material now used for car sills. This may be true whatever material is used; yet the stronger the sills, the greater the margin in which the engineer has to work. Wooden car sills are as unsentient as a wooden bridge and will be discarded just as the wooden bridge has been. The increased cost has for a long time stood in the way of the introduction of steel sills. That time has passed, and now it costs no more to construct a car with steel centre sills than with wooden; and it is known that they are stronger, not only by simple calculation but by actual experiment. An instance will prove this: Not long since a test was made by a railroad in Chicago of a metal car having a 10-in. steel sill. The trainmen expected by running several wooden cars against the steel car at a high speed to double up the 10-in. sills and wreck the steel car. The result was the other way: the metal sills were undamaged, while the wooden cars were broken up. The weight of the steel underframing was but about 75 per cent. of the wooden one, but its strength to resist shocks was more than double. The lesson is obvious. There is another point which must not be lost sight of. A change to steel sills gives a stronger and a stiffer car frame. This means that in service, when a wooden car and a steel car meet, the wooden one will suffer more than the steel one; and there will probably be increased repairs to wooden cars as soon as steel underframes become generally used. Again, the M. C. B. coupler will be more severely tested, and those which stand well on the comparatively soft cushion of a wooden end sill and framing may be broken if they are used with metal sills. However much we may desire to continue to use cars which can be repaired by a carpenter, yet we must face the fact that steel underframes are coming. They are universal for long and short cars in Germany, France and Russia, and are used to a considerable extent in England. Steel has replaced wood wherever wood has been found to be inadequate; and as freight car framing is now insufficiently strong and the strains on it are yearly being increased, it is possible that the use of steel will soon be forced upon us.

The Freight "Blockade."

Probably there has never been in the history of railroading in the United States quite so heavy a demand on the facilities of the roads as there is now. There is not only a shortage of cars for loading at the points of shipment, but there are serious blockades at many of the great traffic centres, and from the Missouri River to tide water there are yards and sidings crowded with loaded cars. To be sure railroad officers deny any serious congestion at points on their own lines; but there is no doubt that blockades are more frequent and more obstinate than in any ordinary year.

This situation, or something like it, has long been foreseen, and the immediate cause is obvious. But of course the railroads are blamed by all sorts of people and for all sorts of things. The simple fact is that the traffic now being moved is not merely unprecedented, it is immense. In the month of November the total grain delivered at Chicago was 19,324,000 bushels—a gain of 54.7 per cent. over November, 1890, and of 51 per cent. over the same month in 1889. The gain in flour was almost 30 per cent. and in hogs nearly 25 per cent. In the two weeks ending Dec. 12 the total car loads of grain received at Chicago were 11,953, a gain of 76.9 per cent. over the same weeks last year.

At Duluth the November receipts of wheat increased over 200 per cent. as compared with 1890. Taking nine Western cities—the chief grain markets—the receipts of wheat increased 100 per cent. over 1890 for the four November weeks, and 97 per cent. for the period from Jan. 1, to Nov. 30. The exports of wheat and flour in the month of November were 20,102,000 bushels against 6,968,000 in November, 1890, or nearly three times as much; and for the five months ending Nov. 30 these exports were 102,454,000 bushels against 36,016,000 in 1890.

But the increased traffic is not in breadstuffs alone. The receipts of cotton at Southern ports increased 20 per cent. in November, 1891, over November, 1890.

The receipts at New York were more than twice as great in the week ending Dec. 11, 1891, as in the corresponding week last year, and from Sept. 1 to Dec. 11 the receipts were 23 per cent. greater than in the same period last year. It would be very interesting to follow this inquiry further, but we have said enough to show something of the immense increase in the movement of the staples to the great centres. It must not be forgotten that while this has been going on there has been an extraordinary local business. The fruit crop, for example, has been as unusual as the wheat crop, and at stations all over the country apples have been delivered by hundreds and thousands of barrels, and have had to be moved to market promptly, for at the approach of freezing weather apples and potatoes must be rushed through even if grain has to wait.

That the railroads have actually moved this enormous volume of freight is the wonder—not that they have been unable to move promptly all that has been offered. It is unfortunate that they have not enough rolling stock, sidings and yard room to get the wheat and corn to market as fast as the farmers, millers and traders wish; but it would have been still more unfortunate for the security holders if they had provided, in average years, facilities for a very extraordinary year. In fact the various conditions which have been at work in recent years, to reduce railroad profits and to lower railroad credits have compelled economies in rolling stock. The railroads still let their customers use their own and their neighbors' cars for storehouses, but doubtless they are less prodigal in this sort of accommodation than they were some years ago. At any rate, economy in this particular would be the natural effect of reducing railroading to rational business methods, and statistics appear to show that it has been practiced. From Poor's "Manual" we find that the freight ton-miles in 1882 were 39,000,000,000; in 1890 they were 79,000,000,000. The increase was 102.7 per cent. But the freight cars increased from 730,000 to 1,061,000 or 45.3 per cent., and the engines from 22,000 to 32,000, or 45.4 per cent. There are two qualifications to be applied to these figures: The "Manual's" reports of freight cars and locomotives have seemed to us rather questionable because of the great fluctuations reported year by year; and the relative capacity of cars and engines has increased much faster than their numbers. Still, making generous allowance for both of these uncertain factors it seems certain that the freight movement has increased faster than the rolling stock. But we may compare 1890 with a year more recent than 1882—a year so recent that we may suppose the method of collecting the statistics to have been improved, and so recent that the heavy modern freight cars and locomotives had already come into considerable use, that is, with 1887. From 1887 to 1890 the ton-miles increased 21.5 per cent., the freight cars 11.8 per cent., and the locomotives 14 per cent. It is again evident that traffic has grown faster than the rolling stock.

But it does not follow that traffic has grown faster than the means of handling it, for the capacity of the rolling stock alone does not measure the capacity of a railroad to handle freight. There are other elements of great importance, and one means of railroad economy has been the development of these elements. With a given equipment of cars and engines, and with a fixed amount of running track, more or less freight can be carried, and more or less money made as the rolling stock is or is not kept moving, and as the tracks are or are not kept "hot" with trains. And here is where the talent of the transportation department comes in. To get the maximum movement of rolling stock, the yards and passing sidings must be ample in area and mileage of tracks, and must be laid out with skill; telegraph offices must be so numerous and so distributed as to pass trains with the least delay, and there must be sufficient train crews and they must be massed at the points where they will be most useful. In all these particulars there is steady improvement, and it would be faster if the operating departments could spend more money.

So after all it would be hard to prove that the railroads are not as well equipped to handle the freight offered to them as they have been at any other time in their history; but if they are the fault does not lie at the doors of the railroad owners and officers. The public which has tried to fix the rates at which railroads should do business, and to limit the profits of the carriers; which has compelled the strictest economies and has scared off investors; the public which has undertaken to run the railroad business must not grumble if it suffers from its own mistakes. It is wholesome that it should suffer, for "experience is a dear school," etc.

Boiler Cleaning Compounds.

Since the first opening of western railroads, where bad feedwater is nearly universal, there has been a series of boiler compounds offered as a panacea for all incrustations. Each year has brought out new ones, all of which have been tried with more or less success. Nearly all of them have had enthusiastic advocates on one railroad or another, yet to-day none of the old compounds remain. All that has been proved is that under certain conditions they can be used advantageously. The proper method of use is too complicated to be determined by the erratic and unscientific courses of experimentation followed in the past.

Now the matter is on a different basis. Several capable men have proved that petroleum, tan bark, potatoes and other vegetable compounds, as well as certain acids and alkalies, will remove old scale in boilers and prevent the formation of new scale; but each one of these different "purgers," as they are called, may have detrimental features which will condemn it. Mr. J. N. Barr, Superintendent of Motive Power of the Chicago, Milwaukee & St. Paul, has taken up the matter from a scientific standpoint, evidently with the belief that a boiler compound is a useful agent, but like every other agent must be properly handled. His paper before the Western Railway Club is the most useful one that has ever been published on this subject, and the discussion of that paper at the November meeting contains further information of great value. A conclusion to be drawn, and one which can be safely followed, is that, at a nominal cost, a locomotive boiler can be fed with almost any bad feed water without causing a detrimental mud or scale deposit *provided always that the water is thoroughly analyzed and the compounds selected accordingly.* Messrs. Barr, Gibbs and Herr in the discussion have acknowledged that an improper use of a compound may lead to foaming, which, as pointed out by Mr. Forsyth, is very detrimental. It has been shown that it is not always best to give the most effective quantity of the compound to a locomotive until the engineer is accustomed to the use of it; otherwise there may be trouble with the injectors, the checks and other fittings, as well as the loss of a few cylinder heads and a waste of fuel.

What may be the advantage of mechanical water purifiers for locomotives it is difficult to say. They have not been tested, as they should be, by the same careful trials that have been given to the purges on the St. Paul road. Hence we do not know enough about mechanical purifiers to say that they are beyond question an efficient and economical device to use on a locomotive. On the other hand, the testimony of the members of the Western Railway Club regarding the chemical purifier is almost conclusive, and teaches this lesson, that from an analysis of the water any good chemist can make a compound which, if properly used, will prevent the formation of scale in a locomotive boiler, and thus save large sums of money which are annually lost in fuel by the coating of the sheets and tubes and expended in unnecessary repairs to the flues and fire-boxes.

These conclusions regarding boiler purges that can be readily compounded by any chemist are, if true, of very great value to any railroad that is compelled to use waters containing scale producing compounds.

There was one point brought out by Mr. Gibbs in his discussion of the remarks of Mr. Lewis that deserves attention. Mr. Gibbs says: "Oils have been advocated many times for preventing scale in boilers. Their action is to break up the scale and prevent scale afterward. I believe this practice is very questionable, for experiments show that any film of oil on a plate is liable to permit serious overheating." This matter is so important to boilers that we feel called upon to emphasize it and offer as an illustration a case of overheating which occurred on some German steamers built in England a few years since. On the second trip out the boilers, which had Fox corrugated steel furnaces, collapsed. A large bill was rendered to the constructors of the vessels, not only for damages but for demurrage. It being a very serious matter a joint committee was appointed to arbitrate the settlement, the agreement being that if the material was proved to be defective, as shown by actual test, the entire cost would fall upon the constructors of the vessel, who were protected in turn by the Fox corrugated furnace makers at Leeds, who agreed to pay the entire cost if the sheets were found defective. On the other hand, the steamship company agreed to stand the loss if the plates stood the Admiralty test. An examination showed that the steel after use in the furnaces was better from a Board of Trade standpoint than before it was corrugated, as shown by the records at Leeds. A subsequent examination showed the whole trouble to have resulted

from an unusually large quantity of oil used and a non-action of the oil separators between the condenser and the feed pump. The oil in the feed water had settled on the crown sheets and permitted overheating, which resulted in a collapse of the furnaces.

The Milwaukee, Lake Shore & Western.

The Milwaukee, Lake Shore & Western Railway has been acquired by the Chicago & Northwestern, into whose system it fits very nicely, though it could also have been worked very conveniently as part of the Milwaukee & St. Paul. The Milwaukee, Lake Shore & Western has a line from Milwaukee to Ashland, Wis., 391 miles (47 miles longer than the Wisconsin Central line between those places), a loop line of the above passing through the Gogebic iron district 88 miles long, and a great number of branches, most of them short, which bring up its total mileage worked to 740 miles, 64 miles of which is leased. What may be called the main stem of the road passes directly along the shore of Lake Michigan from Milwaukee to Two Rivers, 85 miles, and between this and the Fond du Lac line of the Northwestern is the Milwaukee & Northern, a recent acquisition of the Milwaukee & St. Paul; but generally its lines are at a considerable distance from other railroads.

The sudden development of the Gogebic iron mines gave it an enormous traffic all at once, as it were, but it does not get a very long haul for this, and the greater part of its lines are in a heavily wooded district of Northern Wisconsin which was a pure wilderness when the road was built. Where there is much pine timber, such a country furnishes an important traffic almost from the beginning; where it is all pine, when the timber is cut the country is apt to afford very little traffic; but where there is much hard wood timber among the pines, as we believe there is on many parts of this line, as the timber goes off farmers come in, and there is a permanent growth, something like that of the lower peninsula of Michigan, for instance.

The Northwestern, by its Fond du Lac line, will be able to make a much shorter southern outlet to the greater part of the Milwaukee, Lake Shore & Western than the latter's own line, and in connection with the Marshfield Branch of its St. Paul & Omaha line gives a direct western outlet (to Winona & St. Paul) for the lumber produced on the newly acquired lines. It also forms, in connection with the Gogebic line of the Lake Shore & Western, a direct line between Ashland and Escanaba, so that the Gogebic ore can be taken to the latter as well as to the former port. This latter line, moreover, is about half of a pretty direct line between Duluth and Sault Ste. Marie, which can be completed by an interchange with the Minneapolis & Sault Ste. Marie and the construction of a short line to connect the Superior Branch with the Bayfield Branch of the St. Paul & Omaha.

The Northwestern has very extensive terminals at Milwaukee, which may be better utilized by the new acquisition. Naturally there must be great interchanges between a system of 740 miles and lines south and west of it. There were several competitors for these interchanges south of Milwaukee, and also for the lumber going west, which may be even more important; and by the purchase the Northwestern secures most of them for itself. This may not add very largely to its business and profits, but it is an additional inducement to take a property which has been making large and generally increasing profits, the surplus of net earnings over fixed charges of the Milwaukee, Lake Shore & Western having been:

1887.	1888.	1889.	1890.
\$739,062	\$495,565	\$832,494	\$716,584

For the first ten months of this year the gross earnings were \$310,097 (8½ per cent.) less than last year, there having been a very great falling off in the ore traffic, but for the first nine months the decrease in net earnings was only \$96,000. Now, the Northwestern pays for the stock of the new system with \$7,608,000 of its common stock, which with 6 per cent. dividends will require a yearly expenditure of \$456,500, which seems a cheap enough price to pay for profits which have ranged for the last four years between \$496,000 and \$832,000, and have averaged \$696,000. If we ask why the Milwaukee, Lake Shore & Western should be willing to sell for so much less than its profits have been, we must remember, in the first place, that, like most other railroads, especially growing ones, it is practically compelled to invest part of its profits in improvements, as the Northwestern itself has been doing; the Milwaukee company's dividends, indeed, have averaged in the last four years but \$431,572. Then, the long established good credit of the Northwestern is of very great value, and in so extensive a system the strug-

gle for existence with powerful rivals is much more likely to be successful. Further, there is nothing in the nature of things to limit the dividends on Northwestern common to six per cent. At all events, the value of the Milwaukee company's shares at Stock Exchange prices, which was about \$7,600,000 on the first of this month, when the sale was only talked of, is \$8,850,000 now that the sale is announced.

The Rehabilitated Peruvian Railroads.

At the annual meeting of the Peruvian Corporation, Limited, held in London, Dec. 3, the report of the board of directors showed a net profit for the last fiscal year of £110,233, which is a very encouraging result considering the severe floods which impeded the operations on the Trujillo and the Central railroads. The latter road suffered to such an extent that the traffic was maintained in a normal condition for less than two months out of the entire year. In spite of these serious interruptions the net receipts from the Central Railway amounted to £52,793.

The opening of this line to Oroya is now definitely promised for June or July, 1892. Colonization of the Peruvian "Montaña" will then actively begin. During the past year the corporation has had an agricultural commission examining the Chanchamayo Valley, and other portions of the "Montaña," and a second expedition, consisting of Messrs. Ross and Sinclair, practical Ceylon planters, is now on the ground making further studies with reference to these prospective colonization enterprises. The corporation is entitled to locate 1,250,000 acres of land for this purpose. With the completion of this road across the Andes, and the establishments of colonies, Peru will draw almost her total supply of agricultural products from this region.

The Pacasmayo-Guadalupe Railway, showed a deficit of £606, while the Trujillo Railway yielded a net return of £11,433. It is proposed to unite these two lines by a link 3½ miles long, which will materially increase the traffic upon both. The terminal facilities of each are being improved, the corporation having leased the moles at Pacasmayo and Salaverry for the purpose of repairing them.

One of the most important results announced is that the commission of engineers sent to survey an extension of the Chimbote Railway has located a route into the rich valley of Huaylas, which presents no difficulties that will make the cost of construction excessive. This valley is extremely fertile, already supporting a large population, and possessing extensive deposits of anthracite coal. The harbor of Chimbote is one of the finest on the Pacific Coast, and with rail communication into the interior this city will undoubtedly attain immense commercial importance.

The Southern Railway, from Mollendo to Puno, continues to serve a large traffic, having yielded a net income for the past year of £72,400. This will be increased as soon as better transportation facilities are provided from Puno into the Bolivian plateau. A new twin screw steamer, of 520 tons gross, is being constructed for service on Lake Titicaca, and a dredge will be shipped from England in about two months, which will be employed in deepening the entrances to the ports of Puno, Desaguadero, and Chilllayo, and also for opening up the Rio Desaguadero to navigation, in accordance with the recommendations of the board of engineers which recently reported upon that project. The traffic on Lake Titicaca for the last twelve months yielded a gross return of £27,388, and a net profit of £9,855.

The Peruvian railroads, having been in a sadly dilapidated condition, have absorbed a large proportion of the gross earnings in needed repairs, but this drain will be greatly reduced in the current fiscal year. In addition to this, further economies in operating expenses are being introduced. Petroleum is being employed extensively as fuel for locomotives, having been shown in certain instances to effect a saving of 40 per cent. over coal.

The English law of 1888 empowering the Board of Trade to hear and adjust complaints of shippers against railroads has been made the subject of a special report by Mr. Courtenay Boyle, one of the Secretaries of the Board. It will be remembered that this law was passed with a special view of providing for those cases which it seems likely can be settled by negotiation, thus avoiding the delay and expense of formal legal proceedings, questions necessitating resort to the latter method being left, as heretofore, to be dealt with by the Railway Commissioners under former acts. The last report on this subject, if we remember correctly, was made only a few months after the law went into effect and before any cases of consequence had come before the Board, and the present report starts out with the assertion that lack of experience with the workings of the law still precludes intelligent judgment as to its efficiency. Mr. Boyle regards his report as merely a collection of notes giving further experience. Shippers and railroad officers have been engaged for a year in the negotiations connected with the maximum rate law, so that many complaints have doubtless been held in abeyance. About 60 cases have been presented, of which only a few are specially mentioned. A large receiver of coke at Wolverhampton having complained of excessive rates, the Midland Railway agreed to make

a rebate of 3d. per ton to consignees receiving 500 tons a month, which seems to have been satisfactory to the Board of Trade and to the complainants. The principle followed here is directly opposite, it will be seen, to that laid down by the Interstate Commerce Commission in this country, the Providence & Worcester Railroad having been ordered to make no lower rates for large quantities than for a single carload. As our readers are aware, discriminations due to actual or possible water competition are among the most vexatious questions connected with rates in England. A case of this kind is referred to at length, but it appears that the officials of the Board left matters about as they found them. Mr. Boyle thinks that there is an undoubted tendency on the part of shippers to make use of the Board of Trade for the settlement of difficulties in preference to going to the Railway Commission. The appendix to the report gives a summary of the points in each of the 60 cases. It is noticeable that a considerable share of the complaints are based on dissatisfaction with cartage and other station arrangements, matters that would never be heard of in this country. Some parties complain that they have to unload their freight themselves, although the tariff includes delivery to the consignees' door, while rates from "station to station" are quoted reluctantly. One company seems to have fostered its own carting business at the expense of private truck men by restricting the hours during which private teams might enter the freight yard. One man complained because manure was not sheeted (covered with tarpaulins) by the company. A man at Crayford, who complained that sand was charged at too high a rate and who boldly named the rate which he thought would be right, proved to be an ex-stationmaster of the railroad company against which he complained, and the Board of Trade dismissed his complaint. Whether this was because he knew too much about the rates, or for some other reason, does not appear, but this is the only reason given in the abstract.

Mr. A. J. Vanlandingham, the traffic commissioner of the commercial bodies at Kansas City, whose office is one of the longest established of this kind, continues to be one of the most active and enterprising men in this field. When he has a telling point against the railroads he does not fail to secure the aid of the press in promulgating his views. Mr. Vanlandingham has recently published articles giving clear and correct views on the subject of exporting grain and flour via New Orleans, and on Memphis as a seaport. Kansas City is looking also to Mobile as an exporting point, and Mr. Vanlandingham has shown the people interested some of the difficulties in the case. One of the most serious obstacles in negotiations of this kind is the uniformity with which merchants and others unfamiliar with railroad problems shut their eyes to the difficulties they have to encounter, and it is here that the advantage of having an ex-railroad officer to study the matter is most fully apparent. Merchants' traffic organizations are now becoming popular enough so that the railroad men employed by them will not be so lonesome as has hitherto been the case, both Philadelphia and New York having recently taken measures to establish offices of this kind. Denver has not yet taken decisive action, but San Francisco has gone to work vigorously and has secured the co-operation of other cities in the state. Altogether we shall probably soon have ten or a dozen of these organizations. We need not remind our readers that we regard this movement as in every way commendable. Friction between railroads and their customers is curable only by intelligent and frank discussion, and the employment of an experienced railroad man by shippers must tend to add both intelligence and frankness to their side of the discussions, while, at the same time, such a man is qualified to duly expose any lack of these elements on the railroad side. The railroads' faults are generally in other directions, however. The chief value of state railroad commissions, as far as traffic questions are concerned, has been in this function of airing obscure points and correcting misapprehensions, and a "traffic commissioner," appointed by shippers, acting in conjunction with railroad officers, can often accomplish the same ends, with the added advantage that the burden of the expense rests where it belongs instead of upon the state. A very large share of the benefit accruing from the reports made by the Interstate Commerce Commission or by the Massachusetts Commission on shippers' complaints has been due to the publicity given them by the press, and this publicity can be secured about as well by an enterprising traffic commissioner as by a state tribunal.

The Springfield Republican, referring to Professor Hadley's paper on recent railroad legislation, read at the New Orleans meeting of the Bankers' Association, wherein Mr. Hadley attributed the fall in the prices of railroad stocks since 1887 to the Interstate Commerce Act and restrictive state legislation, says: "It never theless remains an undoubted fact that even in states where legislation has been most severe, railroad managers had before and have since voluntarily cut rates to a point far below the limits fixed by law and from causes wholly independent of legislative restriction. The railroad interests have themselves alone to blame for most of the misfortunes that have come upon them." This sounds more like a western granger organ than like an intelligent

and fair minded critic. The closing statement lacks even the spectacular effect of a half truth, for in speaking of "the railroad interests" as a unit the writer makes his phrase wholly meaningless. If the A. B. & D. road reduces through rates to an unreasonably low figure because of the competition of the A. C. & D., which party is blamable, the capitalist who built the latter, embracing the opportunity to make some money, or the state which granted him the privilege? The state has the power, theoretically, to check cut-throat competition, but fails to exercise it or even to permit the use of rational means of settling the disputes incident to it, while the railroad owner, each acting for himself—he cannot act for the "railroad interest" in such a matter, any more than one newspaper can get rich out of the prosperity of its neighboring rival—simply takes the most business-like means he knows of to promote the interests of his road. And he knows of the best means in existence, if we may judge by the unanimity with which all railroads pursue the same policy, the policy of taking freight a shade above cost if more cannot be got, and of going below cost only to prevent worse losses in some other direction. But the Republican doubtless had in mind the knock-down argument of the Iowa rate reducer, that low rates from Omaha to Chicago justify the state in compelling reductions from one point to another within the State of Iowa, which is no more true than that a grocer's willingness to sell sugar at cost warrants a demand that he sell toilet soap on the same basis. Railroad men have themselves to blame for some of their misfortunes, but it is doubtful if they are at fault for not being able to explain to the legislative rate-maker the principles on which a community must support the railroads it has got built for its own accommodation, for that seems an impossible task. The legislator generally sees no objection to a waste of \$10,000 a mile when a railroad is building, but after the road is completed, any extravagance above a thousandth part of that sum excites his apprehension.

The canal at the Sault Ste. Marie closed on the 8th inst., leaving some 13 vessels at the head of Lake Superior for the winter, and though Duluth has had a very prosperous year, shipping 33,428,063 bushels of grain and 2,924,000 barrels of flour, or the equivalent of 47,500,000 bushels, there is still a great deal of grain to come forward. The traffic through the lock at the "Soo" for the past two years was as below:

	1891.	1890.
Number of vessels.....	10,162.....	10,557.....
" "lockages.....	4,936.....	4,970.....
Registered tonnage.....	8,393,535.....	8,454,435.....
Freight tonnage.....	8,888,759.....	9,041,213.....
Passengers.....	26,166.....	24,856.....

The principal items of freight are classed as follows:

Coal, tons.....	2,507,532.....	2,176,925.....
Iron ore, tons.....	3,560,213.....	4,774,768.....
Copper, tons.....	69,190.....	43,729.....
Wheat, bushels.....	38,816,670.....	16,217,370.....
Flour, barrels.....	3,740,143.....	3,239,104.....
Lumber, M. feet.....	366,305.....	361,920.....

The iron ore which passed through the lock was 1,214,355 tons less than in 1890; so that instead of affording over 52 per cent. of the freightage, this traffic has furnished only 49 per cent. The *Iron Trade Review* estimates the total shipments of Lake Superior ore by water for the season as 7,430,859 gross tons, as against 9,003,701 tons for 1890; a loss of 1,572,847 tons. Of this ore 5,939,684 tons came to Lake Erie ports where there were, on the opening of navigation, May 1, 2,400,000 still on the docks. On Dec. 1 of this year 3,503,489 tons were left on those docks. None of last year's ore was unsold, and but about 60,000 tons are unsold this year. Chicago has shipped 101,359,312 bushels of grain at an average freight charge of 2 to 2½ cts. Among its receipts have been 1,057,332 net tons of anthracite and 1,938,567 M. feet of lumber. The expectation of a poor season was universal, and the vessel owners were very slow in commencing the season's work, but as the registered tonnage passing through the lock at the Soo in November of this year was 59 per cent. greater than during the same month last year, it will be seen that there was no hurry to tie up. In fact, the result of the season's work, and the hope for next year, will fill the Lake shipyards with work.

Not long ago the cost of fuel was one of the chief obstacles to the economical working of the Indian railroads. Most of their fuel was coal brought from England, the freight charges on which in the old days were several times the cost in England. Wood good for fuel is scarce in India, as it seems to be in most tropical countries, in spite of their "impenetrable" forests. Now, though the coal production of India is still small, some of the railroads there get their supply at a very low cost. The East Indian, a principal line, reports its coal cost at an average of only 60 cents per long ton, and it burned on an average 52½ lbs. of it per train mile, costing 1½ cents. No other Indian line gets its fuel at anything like so low a price, though the East Indian carries coal for less than half a cent per ton per mile for all the other state railroads; but the Eastern Bengal pays \$1.76 per ton, and another important line pays \$2.72 for the same coal; but the Northwestern, the largest system, which uses both English and Indian coal, pays an average of \$1.80, and another great line \$4.24, and a third (using chiefly English coal) \$6.31. This English coal cost one company \$8.72 delivered at one station and \$11.16 at another, while it paid less than 70 cents per ton for some native

coal. Another line, which burns wood chiefly, paid as low as \$1.44 per ton for some of it, and on the average \$2 per ton, and for English coal \$10.40. It is preparing to use more extensively a native coal which cost it \$2.70 per ton last year. One of the chief Bombay lines used English coal almost exclusively, at a cost in Bombay of about \$6 per ton, which for fuel that has been carried 7,500 miles seems a sufficiently low price.

As we have noted before, there is a test in progress on the Erie to ascertain the relative merits of a 4-cylinder Vauclain compound and a single expansion engine, both being 10-wheelers, newly constructed, and of identical dimensions. As these tests will shortly be completed and will probably be given to the public, an examination of the cylinder capacities is of interest. The following are the results of calculation:

Total capacity of one 21 in. x 26 in. cylinder = 9,006 cu. in.
 Total capacity of two high-pressure cylinders 14 in. x 26 in. = 8,008 cu. in.
 Total capacity of two low-pressure cylinders 24 in. x 26 in. = 23,524 cu. in.
 Capacity of the two high-pressure cylinders = 89 per cent. of one of the single expansion cylinders.
 Capacity of the two low-pressure cylinders is 2.6 times that of both the single expansion cylinders.
 The ratio of the capacities of the high and low pressure cylinders is 2.94.

One marked difference between this and some other compounds is found in the volumes of the high-pressure cylinders. It has been somewhat customary in making two-cylinder compounds to give to the high pressure cylinder a diameter one inch greater than that of the cylinders of the ordinary engine with which it is supposed to be equivalent. Thus, some two-cylinder compounds have been made with 20-in. cylinders to replace 19-in. cylinders of the ordinary type. The increase is about 10 per cent., and contrasts strongly with the decrease of 11 per cent. noted above.

During 14 months ending with October last, the Standard Car Coupling Co. has had 10,676 couplers on New York Central cars, and has obtained the following report of the breakages of drawheads and knuckles:

Breakages among 10,676 Standard Couplers on New York Central & Hudson River Railroad, from Sept. 1, 1890, to Nov. 1, 1891.

Date.	Draw-heads.	Knuckles.	Date.	Draw-heads.	Knuckles.
September, 1890.....	5	49	May, 1891.....	13	109
October, 1890.....	8	81	June, 1891.....	28	110
November, 1890.....	15	147	July, 1891.....	13	72
December, 1890.....	50	131	August, 1891.....	19	104
January, 1891.....	22	116	September, 1891.....	21	73
February, 1891.....	66	132	October, 1891.....	18	112
March, 1891.....	63	172			
April, 1891.....	51	176	Total.....	422	1,565

From this it appears that the average annual breakages have been 3.61 out of each hundred drawheads, and 13.41 out of each hundred knuckles. Although these results may be regarded as good, the company claims that it was unfortunate in the quality of the earlier steel castings and that, as showing what can now be done, the results of the last six months experience should be considered separately. The breakages, May and October, 1891, inclusive, were, drawheads, 112; knuckles, 571; indicating an annual breakage of only 2.1 out of each hundred drawheads, and 10.7 of each hundred knuckles.

The Yankee rainmakers are not to have the field to themselves. The Madras Government, India, has been making experiments to produce rain by concussion, using what we believe our rainmakers call "ground batteries," exploding 100 lbs. of dynamite in 10 charges, at intervals of one minute. "Within six hours a magnificent shower of rain fell, which lasted half an hour." At least this is what our Calcutta correspondent reports, and something of the same sort has reached us through English journals. Uncle Jerry will have to hustle or some effete monarchist will steal his thunder. But Melbourne, sweating in a barn and shaking a stick out of a hole in the roof, is still without a rival. That is, his only rivals are Indian medicine-men and African coojoors, who have no sense about getting up stock companies to work their processes, and cannot hurt his business.

Last week we gave an account of a remarkable fast heavy run on the Pennsylvania Lines. At that time we were not in possession of detailed information regarding the engines. We have since received the following, which gives the heating surface and grate area. The engine at the head of the train was a small, odd, eight-wheeled engine, with a grate area of 14½ sq. ft., and a heating surface of 827½ sq. ft., 84 of which was in the firebox and 743½ in the flues. The other engine was a modified class "O" engine, with 31½ sq. ft. of grate and 1,044 sq. ft. of heating surface, of which 128 was in the firebox and 916 in the flues. The total heating surface in both engines was less than is now frequently had in one engine.

The *Financial Chronicle* reports a gain in the gross earnings of the railroads in November as compared with last year of \$4,261,000, or 9.42 per cent. The October gain was 8.54 per cent. The November comparison is for 142 roads. The gain for the 11 months ending with November gives \$29,165,000, or 6.4 per cent. In the previous year the gain for the same period was \$34,853,000. The most striking improvement is in the Northwestern roads, 10 of which show a gain of 17 per cent. Seven South-

western lines show a gain of nearly 9 per cent. Of course the trunk lines from Chicago to New York show great gains, and *Bradstreet's* gives the gains of five of them, in November, as 13.8 per cent.

NEW PUBLICATIONS.

The Phosphates of America, Where and How they Occur, How they are Mined, and What they Cost, with Practical Treatises on the Manufacture of Sulphuric Acid, Acid Phosphate, etc. By Francis Wyatt, Ph. D. 8vo. Pp. 187. Index. New York. The Scientific Publishing Co. 1891. Price, \$4.

This is a valuable book, appearing at an opportune time, written by a master of the subject. The style is simple and clear, the manner of treatment exceedingly interesting, so that reading it is a pleasure independently of any peculiar interest the reader may have in the subject.

The first chapter deals with the peculiarities and needs of different soils, which might have been advantageously expanded. It also includes statistics showing the amount of phosphoric acid annually required as food for the leading agricultural products of the United States.

In the second chapter, on the assimilability of phosphates, we find the statement that "nothing can stem the demand for artificial manures; it will go on increasing with such steadiness and rapidity that the visible sources of supply will soon become inadequate." In connection with this we are glad to see Dr. Wyatt taking a good stand in favor of the use of raw as against acid phosphates, which would return to the farmer a larger percentage of the phosphate put upon the land, although the results would not become apparent for several years after the initial treatment. It might have been well had the author expanded here also, and given examples showing how a farmer, using a mixture of "soluble" and "insoluble" fertilizers for three years, could thereafter employ raw phosphates, and in 10 years become a richer man. We also commend his defense of phosphates of iron and alumina.

The description of the apatite mines of Canada and the remarkable phosphate beds of South Carolina and Florida is admirable, both as regards their genesis and manner of occurrence; and should the book be read as widely in the Southern States as it deserves to be the knowledge gained might lead to the discovery of other valuable deposits. Aside from the lucid descriptions of these beds and the methods employed for the exploitation, the illustrations from photographs tell the story forcibly after the manner of an object lesson. Details of various plants, with their costs and the costs of mining, are given.

We regret the necessity of finding fault with the chapter on sulphuric acid manufacture. The preliminary description of the reactions and general rationale of the process is excellent, but the details of plant and actual practice, while clear enough to the chemist, would leave the uninitiated in a state of "confusion worse confounded." The Doctor has erred in this case on the side of brevity, and he could enhance the value of the book by inserting new pages in future editions giving a full explanation of the pyrites burners, of the use of the Gay Lussac and Glover towers, and of the siphon or acid "egg."

The chapters on the manufacture of the ordinary commercial phosphates, and on the best methods of analysis, are models of what that on sulphuric acid should have been. In fact the chapter devoted to the operations of the laboratory, with its copious tables, formulæ for standard solutions, etc., is a perfect manual for the phosphate analyst. The index is an ample guide to the contents of the volume.

The Engineering Magazine, December, 1891. Engineering Magazine Co., New York.

Cassier's Magazine, December, 1891. Cassier Magazine Co., New York.

These magazines have their customary tables of more or less popular and scientific articles. In the *Engineering Magazine* Dr. Coleman Sellers begins the publication of a series on "American Supremacy in Applied Mechanics," and Mr. J. F. Holloway has a short and entertaining paper on "Fulton Night with the Engineers." A profusely illustrated article full of good suggestions is on "Picturesque Suburban Railroad Stations," by Bradford L. Gilbert.

In *Cassier's Magazine* a series on the "Technical Schools of America" is begun with an account of the Sibley College at Cornell, and there is a paper on the American Society of Mechanical Engineers, telling something of its organization, and quarters and work. There are a number of strictly technical articles of considerable value.

The Scientific American Cyclopaedia of Receipts, Notes and Queries. Edited by Alfred A. Hopkins. Pages 680, octavo. New York: Munn & Co. 1892. Price \$5.

This is a collection of information which has appeared within the last 50 years in the columns of the *Scientific American*, especially under the department of notes and queries. Those who are familiar with the *Scientific American*, and probably nearly all of our readers are more or less so, need not be told what the nature of this information is. It covers receipts for doing pretty nearly everything.

Philadelphia Securities; A descriptive and statistical Manual of the Corporations of Philadelphia. Philadelphia: Burk & McFetridge; 306 Chestnut street. 1891.

This is a volume of 644 octavo pages, the scope of which is indicated by the title. It contains classified lists of companies having offices in Philadelphia, with more or less information as to the financial history and condition of each.

Annual Report of the Commissioners of Railroads, State of Michigan, for the year 1891.

This report is for the calendar year ending Dec. 31, 1890. The mileage of railroads operated in the state is reported at 6,985, of which 148 miles is reported by "ore and forest" companies.

Journal of the Franklin Institute, December, 1891.—The two papers of chief interest in this issue are "The Development of Pig Iron Manufacture in the United States," by John Birkinbine, and "Fuel Gas; Its Production and Distribution," by Arthur Kitson.

TECHNICAL.

Manufacturing and Business.

The Atlantic Coast Line is asking for bids for the construction of a train shed of iron or steel at Goldsboro, N. C. The structure is to be 300 ft. long, with a roof span of 50 ft. x 21 ft., clear above the ground, and an overhang on one side of 10 ft.

The "Acme" lamp (Adams & Westlake) has recently been specified for 25 C. & H. D. cars; 20 C. & E. I. cars and 60 L. S. & M. S. cars. The following is a letter to the Adams & Westlake Co. from Mr. A. Burt, Superintendent Railway Mail Service, Fifth Division, Cincinnati, O.: "The 'Acme' burner is in use on a great many postal car lamps in this division. It stands hard service, gives a better light and is generally more satisfactory than any burner we have used. The 'Acme,' as used on the No. 124 lamp, gives the best results yet obtained by any lamp for postal car purposes that has been tried in this division."

Messrs. Fraser & Chalmers issue a lithograph of the Masonic Temple building in Chicago, they being the contractors for the steam power. This includes two Fraser & Chalmers Corliss engines of 500 H. P. each, eight Scotch marine steam boilers of 125 H. P. each, together with line shafting, piping, tanks, reservoirs, etc. The total weight of this machinery is 325 tons. The same lithograph gives some statistics of the material in the building, which includes 7,000 electric lights, eleven miles of steam piping and 24 miles of water and gas pipe. The total steel used in the building amounts to 4,700 tons, and the estimated cost of the structure is \$4,500,000. There are to be 17 elevators capable of carrying 50,000 persons a day. It will be seen that this one building is to be quite a little city in itself.

The following is an extract from a letter just received by us from the General Manager of the Schuttler Mfg. Co.: "As a result of an advertisement in the *Railroad Gazette*, the Schuttler Mfg. Co. last Friday received a letter with a foreign post mark, and after exhausting our entire force of interpreters we managed to find a clean and educated nihilist, who translated the letter for us, which was a large order for our track drills from Russia for use on the Imperial railroads. Thus is the persistent and judicious advertiser rewarded when he uses the *Railroad Gazette*. The Czar will, however, be obliged to possess himself with patience, as there are a great many American railroads which also want the drills, and whose orders are ahead of that of his Imperial Majesty, now waiting to be filled."

The corporation known as Sprague, Duncan & Hutchinson, Limited, is ready to do the work of consulting electrical engineers. Mr. Frank J. Sprague is known throughout the world as the inventor of the Sprague Motor, now in general use in the United States, England, France, Germany, Italy, Japan, and elsewhere. He has resigned his office as Vice-President of the Sprague Electric Railway & Motor Co., and Consulting Engineer of the Edison General Electric Co. Dr. Louis Duncan's work in electricity has made him the head of the electrical department of the Johns Hopkins University. Dr. Cary T. Hutchinson was Mr. Sprague's assistant in the Sprague Electric Railway & Motor Co., and thereafter assistant to the Chief Engineer of the Edison General Electric Co. The office of the company is at 15 Wall St., New York.

The Cleveland City Forge & Iron Company has lately turned out some intricate as well as heavy forgings. A spare shaft for the Sound steamer *Pilgrim*, 39 ft. 5 in. long and 27 in. in diameter, weighed when finished 68,200 lbs. The rudder frame for the New York, with a stock 18½ in. in diameter, weighed nearly 14 tons, and another for *Cruiser No. 12*, with a stock 19½ in. in diameter, weighs over 16 tons. These rudder frames are about 20 ft. high and 15 ft. wide. A beam stop for a Sound steamer, 36 ft. 6 in. long and 16 ft. 8 in. wide, with a mean section of 11½ by 10½ in., weighed 36,310 lbs. The comparatively large amount of ship building on the lakes is developing forging, engine building and the construction of propeller wheels and large boilers at several inland points, and much of this product goes into use on the seaboard.

Shop Notes.

Since the shops of the Chicago, St. Paul & Kansas City, at South Park, Minn., were built, there have been added nearly 500 miles of road to the system, and the equipment greatly increased, but the capacity of the shops remains as it was at first. It is surprising how much work is done in these shops, and if there were sufficient room the tracks would soon be rid of a number of dead engines and bad order cars.

The car shop, which was recently destroyed by fire, has been rebuilt and is again occupied. An excellent plan for doing away with 28 ft. 30,000-lb. capacity cars has been adopted. Twenty-five of them have been rebuilt as way cars and another lot of 15 will soon be changed. One hundred and fifty platform cars are being changed to gondolas for the coal traffic.

The work done in the coach department is very good. One of the company's dining cars, the "Minnesota," has just been rebuilt. The outside of the body is solid mahogany, and the inside finish is antique oak.

The machine, boiler and blacksmith shops are all busy and working all the men there is room for. All of the pits in the machine shop are occupied, and the boiler

shop also has its quota of engines, all of which are receiving thorough repairs. The flue welder and the spring furnace are equipped with the Ferguson oil burner and highly satisfactory results are obtained.

The Chignecto Ship Railroad.

Mr. Ketchum, the manager of the Chignecto Marine Railroad, has notified the Dominion Government that an application will shortly be made to the Government for part of the subsidy to be payable as interest on the bonds which are to be issued. This, Mr. Ketchum says, would practically be a guarantee that the interest on the bonds will be paid and will be no more expenditure on behalf of the Government than if the work had been completed this year, according to contract, and the subsidy paid as agreed upon. The subsidy to be given by the Government is \$170,000 a year, payable after the completion of the work in half yearly installments of \$85,000 each for 20 years. The work of building the ship railroad was commenced in October, 1888, and another season's work would probably finish it. The most difficult and risky part of the work, according to Mr. Ketchum, has been accomplished. He says that nearly all the earthworks had been completed, the roadbed had been graded, the embankment and foundations had been made solid and 12 miles of single track laid. About \$3,500,000 has already been expended and about \$1,500,000 more is needed to finish the work.

Ore Docks.

The Duluth & Iron Range will let the contract for building a dock at Two Harbors, Minn., next week.

Chicago Buildings.

The Western Society of Engineers is considering a resolution to appoint a committee of five members to make investigations and tests on the following lines with reference to Chicago building construction: 1st. The nature and action of the clay strata underlying Chicago with reference to the foundations of large buildings. 2d. The strength of columns, cast iron, wrought iron, and steel of sizes actually used in building construction, and the effects of eccentric loading. 3d. Fireproofing and its efficiency and the effects of moderate degrees of heat on iron columns and beams. 4th. The rigidity of steel buildings and what should be required in the way of lateral bracing.

To Raise the "Blanco Encalada."

Advertisements have been published in San Francisco calling for bids for raising and repairing the sunken Chilean ironclad "Blanco Encalada," which was destroyed by a torpedo at Caldera last May.

The Canadian Lock at the "Soo."

It is said that the Canadians are proposing another change in the plan for this lock, that is to make it 900 by 60 ft. in plan. The American lock is to be 800 by 100; this will accommodate four vessels at each lockage, whereas the proposed Canadian plan will only chamber three vessels, and not more than two of the largest lakers, as they are 330 ft. long. But it is claimed that the gates of a lock 60 ft. wide can be operated with more speed than those of one 100 ft. wide, so that the narrow lock will be as efficient as the wider one. The gates of both, however, will be operated by hydraulic power, and it is doubtful if there will be any appreciable saving in time.

The Paris Seaport Project.

The committee appointed to consider the project of making Paris an inland seaport has handed in its report to the municipal authorities of the French capital. The great canal, which it is proposed to construct between Paris and Rouen, would be 182 kiloms., or 114 miles long, and 6.2 metres, or nearly 21 ft. deep. For large ships a port would be built between St. Denis and Clichy, and smaller ports would be constructed at Audelys, Vernan, Poissy, Achieres and Argenteuil. The cost of the undertaking is estimated at 150,000,000 francs.

Interlocking in Illinois.

The Illinois Railroad and Warehouse Commission has ordered interlocking to be put in as follows. At Paducah Junction, at the crossing of the Illinois Central, Wabash, and Chicago & Alton, each road to pay one-third of the cost of construction and operation; at Jacksonville, at the crossing of the Wabash, Chicago & Alton, and Jacksonville Southern, each road to pay one-third of the cost; at Corwith, at the crossing of the Atchison, Topeka & Santa Fé and the Chicago & Alton, the former road to pay two-thirds and the latter one-third; at the crossing of the Belt Railway, the Chicago & Alton and the Atchison, Topeka & Santa Fé, in Chicago, near Hawthorne, the Belt Railway paying four-tenths and the two others three-tenths each of the cost of construction.

Julia Snow Plows.

The Chicago, St. Paul & Kansas City will make a trial of the Julia centrifugal snow plow this winter. One of these plows is now at the shops of the road, at South Park, Minn., awaiting a fall of snow that will warrant putting it into service.

The Mexico Valley Drainage Tunnel.

The project of draining the city and the valley of Mexico has met with greater difficulties than were expected on account of the very large inflow of water, but it has not been abandoned as reported. Read & Campbell, the contractors having charge of the tunnel work, having notified the Government of their inability to complete the drainage on the basis of the existing contract, some modification of the contract will probably be made so as to secure the completion of the work.

Electro-Pneumatic Signals.

The Pennsylvania has begun the work of extending the Westinghouse pneumatic signal apparatus eastward from Wilkesburg, and will put in several electric interlocking machines between there and Stewart's, about 10 miles further east. Automatic block signals of this system have been in use from Pittsburgh east to Wilkesburg several years and the extension indicated by this announcement will make about 18 miles in all, most or all of which is a four-track line.

The Government Lock at the "Soo."

Messrs. Hughes Bros. & Bangs, contractors for the masonry on the new American lock at the "Soo," have put up a plant, mostly hoisting and traveling cranes, costing about \$150,000. Their contract amounts, in round numbers, to \$1,500,000, and comprises 20,000 cubic yards of face stone and 60,000 cubic yards of backing. The stone will be quarried on Kelley's Island, Lake Erie, and cut to dimensions there. About 750 men will be employed through next season.

Technical Schools.

We have received a catalogue of the Case School of Applied Science of Cleveland, Ohio, for 1891 and 1892. This school was founded by an endowment by Leonard Case in 1876. Recently two new buildings have been erected, one for a chemical laboratory, the other for a mechanical laboratory and machine shop. A wing of the mechanical laboratory is fitted with assay furnaces. There are also shops assigned to the electrical engineering department. Students have free access to the Case library of 20,000 volumes. The fee for tuition is \$75 a year, and for chemicals and use of apparatus \$25 a year. Opportunities are given to students who are good mechanics to pay a part at least of their expenses by work in the shops, and five prize scholarships of \$300 each are offered. Those who wish for information concerning this school should address Eekstein Case, Secretary, 9 Rockwell Street, Cleveland, Ohio.

THE SCRAP HEAP.

The Forth Bridge Steel Contract.

Messrs. Tancred, Arrol & Co., contractors for the Forth bridge, contracted with the Steel Company of Scotland in 1883 for all the steel (except 12,000 tons already bought) needed for the superstructure of that work. In 1887 the Steel Company claimed damages from the contractors for loss of profits on 5,000 tons of steel bought of other parties, and got £14,850. Later on they claimed £50,000 damages in respect of another lot of 14,000 tons of steel used in the bridge and not made by them. Kyllachy, a Scotch law lord, has just decided that they are entitled to damages as to 11,617 tons. This award will probably give the Steel Company about £40,000 additional profits. His Lordship held that "the defenders were bound to take the whole of the steel (including rivets) from the pursuers," and fixed the amount of steel bought from other parties, but supposed "the parties would adjust the amount upon the quantity which he had determined," and the counsel for the contending parties agreed to this. In fixing this quantity, the amount ordered by the contractors was neglected, as that "did not show the ultimate destination of each quantity." Nor did the judge accept Sir Benjamin Baker's computations, though he did not doubt the accuracy of the engineer's measurements; but he made a lump allowance of 800 tons, "in respect of excess of thickness of plates, and excess of waste beyond Sir Benjamin Baker's allowance." This brought the weight of the steel in the superstructure of the bridge up to 55,000 tons.

Pass Legislation.

The South Carolina House of Representatives has passed the Anti-Free Railroad Pass Bill, which had previously been passed by the Senate. It prohibits the receiving or using of free passes on railroads by members of the Senate or House, or State or county officials, or judges of any court of record in the state. A provision excepting the Railroad Commissioners and the Superintendent of Education was stricken out. The penalty provided in the bill is \$500 fine or six months' imprisonment for any officer accepting a pass, and a similar fine for any railroad officer offering the pass.

Argentine Railroads.

The report of the railroads in Argentine Republic for the year 1890 gives the following table showing the miles of road in operation in 1889 and 1890:

	1889.	1890.
B. Ayres & Rosario.....	343	735
Central Argentine.....	273	432
G. Western.....	318	318
East Argentine.....	99	99
G. Northern.....	688	688
Western, B. Ayres.....	750	634
Pacific.....	425	425
Andine.....	157	157
Entre Rios.....	184	184
B. Ayres Northern.....	18	66
Ensenada.....	66	66
Great Southern.....	838	838
S. F. Western.....	130	130
S. F. Colonies.....	432	506
N. W. Argentine.....	93	112
Chubut.....	43	43
Chumbicha.....	40	40
Cordoba Central.....	130	130
N. E. Argentine.....	170	170
Total.....	5,027	5,710

At the end of the year there were in course of construction 1,364 miles, making a total mileage of 7,074. The capital invested amounted to \$234,000,000; the receipts in 1889 were \$17,957,388; in 1890, \$16,935,420. Owing to the financial crisis there was a falling off both in the amount of freight transported and in the number of passengers carried.

An Indian Master Car Builders' Association.

The 1890 report of the railroads of India says: "A committee has been formed somewhat on the principle of the Master Car-Builders' Association of America, composed of the chief locomotive and carriage and wagon superintendents of the more important railways in India. Two annual meetings have been held, the first at Lucknow in December, 1889, and the second at Bombay in December, 1890; and a great deal of useful work has already been accomplished."

Power Transmission by Compressed Air in Paris.

According to the balance sheet of the year 1890, which has just been issued, the receipts from all sources (from regular subscriptions, for driving clocks, motive power, etc.) have amounted to 1,451,676 francs, and the expenses and sundry charges to 1,759,385 francs, the result being a deficit of 307,709 francs. The quantity of compressed air delivered in 1890 has been 180,000,000 cubic metres, being an average of 494,000 cubic metres per diem. The deficit was explained at the general meeting of the company as having been caused by the great quantity of work it was necessary to carry out in the year.

Record of Scientific Progress.

Mr. Robert Grimshaw, 21 Park Place, New York, asks us to state that he is preparing for publication by Cassell a record of scientific progress in 1891. He asks our readers to send him particulars of noteworthy things that they have done during the past year, or that they may think of as worthy of a place in such a record.

LOCOMOTIVE BUILDING.

The Lehigh Valley has ordered 20 locomotives from the Baldwin Locomotive Works in addition to the 20 engines previously awarded by the company to the same firm.

About 250 locomotives will probably be built during the year 1892 for the Pennsylvania Railroad lines east of

Pittsburgh, and about 130 for the lines west of Pittsburgh.

The Chicago, St. Paul & Kansas City has received 18 mogul freight locomotives from the Cooke Locomotive Works. Seven more will be delivered soon. These engines have 18 x 24 in. cylinders, and are equipped with Krupp tires, New York Air Brake Company's driver brakes and Nathan injectors and oil cups.

The Minneapolis & St. Louis will soon place an order for two switching locomotives.

The Baldwin Locomotive Works have contracts for six locomotives to be shipped to South America. One is for the Cia Huachaca de Bolivia, a wealthy mining company; one for the Ferro Carril del Llano de Maipo; two for the Agua Santa Railroad and two for the Huachaca & Pacamayo Railroad. The first four are moguls, metre gauge and of special design. The remaining two are switching locomotives for metre gauge.

CAR BUILDING.

The St. Charles Car Co. is building 500 box cars for Messrs. F. H. Peavey & Co., of Minneapolis, Minn.

The Lehigh Valley car order has been made 4,000 cars, but the contracts for the extra 1,000 have not yet been finally awarded. The cars are all of 60,000 lbs. capacity, 2,000 being box cars and 2,000 double hopper gondolas. The cars have the company's standard rigid trucks, and are equipped with air brakes, M. C. B. couplers and metal brake beams. Contracts for five passenger cars have also been let.

The St. Charles Car Co. will complete this month 18 of the 30 passenger cars recently ordered by the Chicago, Burlington & Quincy, and the company is now working on passenger cars for the Lake Shore & Michigan Southern. This week 150 coal cars of 60,000 lbs. capacity will be delivered to the Texas & Pacific. The Missouri Pacific order for 100 furniture cars has been increased 200 cars. They are for the St. Louis, Iron Mountain & Southern. The cars are exceedingly large.

The St. Charles Car Co. has delivered to the Toledo, St. Louis & Kansas City the first two of five chair cars ordered for that road. They are exceedingly handsome, and are a notable addition to the splendid new equipment lately built by the Toledo, St. Louis & Kansas City road. They are novel in design and equipments, and are furnished throughout with much taste. The cars are 56 ft. long, seating 40 persons, and have the Scarritt reclining chair and Baker car heater. In addition to the usual toilet rooms at each end there is a smoking room and a buffet.

The statement published Dec. 4 regarding the Pennsylvania order for freight cars placed that week was not correct in all particulars. The contracts were let as follows: Peninsula Car Co., Detroit, Mich., 750 cars; Michigan Car Co., Detroit, Mich., 750; Barney & Smith Mfg. Co., Dayton, O., 500; Erie Car Works, Erie, Pa., 500; Terre Haute Car & Mfg. Co., Terre Haute, Ind., 500; Murray, Douglas & Co., Milton, Pa., 500; Wells & French Co., Chicago, Ill., 200; Pardee Car & Machine Works, Watsonstown, Pa., 200; and Arthur King, Middletown, Pa., 100. All these are to be box cars. The Altoona shops are to build 1,000 box and 500 gondola cars.

BRIDGE BUILDING.

Miscellaneous.—The Kansas City, Fort Scott & Memphis has recently let a contract to the Pencoyd Iron Works for a 120-ft. pony truss bridge.

The Elmira, Cortland & Northern has contracted with the Phoenix Bridge Co. for two new structures to replace the viaducts known by the names of Deep Gorge and Block House. The former is 800 ft. long and 150 ft. high at the highest point, and the latter 700 ft. long and 50 ft. high.

The New York, Lake Erie & Western has awarded the contract for the Passaic River drawbridge, on the Eastern Division of the main line, to the Union Bridge Co. The estimated weight is 650 tons.

The Great Northern has placed contracts for bridge work with the Milwaukee Bridge & Iron Works and the Wrought Iron Bridge Co., of Canton, O.

Moncton, N. B.—It is proposed to replace the old bridge spanning the Petitcodiac River, recently wrecked by a heavy storm, with an iron structure. The bridge was originally built in 1888 at the cost of \$60,000. It was rebuilt in 1870 at a cost of \$42,000. In August last the local government began to repair it, and since then have had men constantly at work. It was 1,660 feet long, and about half of the structure has been wrecked.

Northumberland County, N. B.—The cost of the bridges to be built and repaired in Northumberland County, N. B., and of those now under contract from the local government, will, it is estimated by Engineer Beckwith, be in the vicinity of \$20,000.

Tacoma, Wash.—The Commissioners of Pierce County, Wash., have let the contract to the Tacoma Bridge Co. for building a bridge across the Mashel River for \$894.50.

Winnipeg, Man.—The town is taking active steps to secure a new bridge over the Assiniboine River at a cost of from seventy-five thousand to ninety thousand dollars, and it is believed that there is now a good chance of this old project being carried out.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In New Jersey the Supreme Court rules that a city ordinance which prohibits digging up the surface of any street except by permission of the board of aldermen, as applied to a railroad company laying its track across a street within its located right of way, is not a reasonable regulation of the company's exercise of its corporate franchises.

In the same case it is held that a grant to a railroad by its charter of power to lay out and construct a railroad between designated termini carries with it power to cross streets and highways within the location of its road without any special grant to that effect.

In Florida the Supreme Court holds that where a railroad operates and controls a railroad in its own name and through its own officers and employees, it is liable to a third person for an injury resulting to him from negligence in the management or operation of the same, and no exemption from such liability is caused by the fact that its possession and operation of the road are under an agreement between it and the owner of the road,

by the terms of which it is to operate the road in its own right, furnish the rolling stock, charge for the use of the same, and also charge a certain per cent. of its own expenses as the operating expenses of the road.

In the Federal Court orange growers in Florida shipped their fruit from one point in that state to another point in the same state, consigned to their agent at the latter point, who immediately forwarded them to their destination in another state. It is held that the shipment from the growers to the forwarding agent was interstate commerce, not subject to the control of the Florida Railroad Commission.

In Connecticut the plaintiff contracted with the promoters of a proposed railroad company to procure the company's right of way from all the land-owners along its line for a certain sum in gross, to be paid in the capital stock of the company. After incorporation of the company, this contract was ratified. Plaintiff occupied himself seven months, and expended about \$6,000, in securing rights of way. The legislature having denied an application of the company for permission to build a bridge over a river, essential to its existence, the company allowed its charter to be forfeited without issuing any stock. The Supreme Court holds that plaintiff was entitled to damages for the violation of his contract.

Injuries to Passengers, Employees and Strangers.

In a case in Texas the complaint charges that a boy of ten years made a contract with the company to carry him to a certain flag station, where he lived; that on the train's approach to said station it was signaled to stop; that the company negligently disregarded such signal, and did not stop the train; that the boy, being frightened and confused by being so carried past the station, jumped from the train, and was thus injured. The Supreme Court decides that the petition did not show on its face that the boy was guilty of contributory negligence, since whether the mind of a boy of that age is mature enough to make him responsible is a question for the jury.

In Minnesota the rules of the railroad required every passenger to procure a ticket before entering the cars, or, in default thereof, the conductor to collect an additional sum of 25 cents, and issue a rebate certificate therefor. Plaintiff failed to procure a ticket because of the ticket agent's absence from the depot, and, on his refusal to pay the additional sum demanded by the conductor, which he did; but no actual force or insulting language was used. The Supreme Court sets aside a verdict for \$500 rendered against the company.

In Virginia it is held by the Supreme Court of Appeals that although a railroad required fare for all children over five years old, the fact that a father purchased no ticket for his child, six years old, will not bar recovery for injuries causing his death; and whether or not he knew that a ticket was required is immaterial.

In New York, the deceased had charge of the movement of all of defendant's freight cars in its yards at Poughkeepsie. On the day of his injury he directed a yard engine to move a car of coal which was standing under a chute. After the engine was coupled to the car, deceased got on the car, and it moved off, and he was seen no more until found under a mass of coal, which had escaped through the trap at the bottom of the car. The chain which held the trap up had been broken and mended with wire two weeks before, and the bottom of the car had been repaired by putting boards into it to prevent the coal from falling through the trap, which could not be entirely closed. Deceased was aware of the defective condition of the car. The Supreme Court affirms a verdict against the railroad.

In Oregon it is ruled by the Supreme Court that a section hand riding on a work train from one place of his work to another, under the charge of the roadmaster, is fellow-servant of the conductor and engineer of such train.

In New York the Supreme Court holds that an employee is not guilty of contributory negligence in attempting to couple cars by entering between them on the inside of a curve, when signals were being made on that side of the train which it was necessary for him to observe.

In Virginia the plaintiff, on a car on the front end of the train, attempted to descend to uncouple the engine. The bottom rung of the car ladder was missing, and, while feeling for it with his foot, the engineer, without the customary signal, suddenly backed the engine against plaintiff and injured him. The night was dark, and the bumper on the end of the car was broken off, so that the tender came up close to it. Plaintiff did not know the bumper had been broken off, and it was shown that the train was made up under the supervision of the regular car inspector, who was not called as a witness by the company. The Court of Appeals decides the defective condition of the car was the proximate cause of the injury, and defendant was liable, although the negligence of a fellow-servant, the engineer, contributed to the injury.

The Supreme Court of New York rules that a person passing the rear of a standing train has a right to suppose himself out of danger, in the absence of any warning.

In Ohio it is held by the Supreme Court that it is not negligence *per se* for one to voluntarily risk his own life or safety in attempting to rescue another from impending danger.

In Louisiana the Supreme Court holds that a railroad whose freight train derailed and runs into an adjoining building, causing damage to person and property therein, is guilty of gross negligence, and liable for indemnity.

In Alabama the plaintiff wishing to reach a train, between which and himself another train was standing on a down grade, walked along some 30 ft. past the engine of the latter, and, turning, stepped on the track in front of it. He did not look back nor listen, and was struck by it and injured. Neither the bell nor whistle was sounded, and there was no evidence that the engineer saw his perilous position in time to warn him, or knew he would attempt to cross. The Supreme Court rules he was guilty of contributory negligence, and could not recover.

The Supreme Judicial Court of Massachusetts rules that the existence of a railroad crossing of gates, seemingly intended to be shut when trains pass, does not excuse a traveler from the duty of looking before crossing, but does give him the right to take that fact into consideration in determining to what extent he will look.

The Supreme Court of Missouri rules that where a boy of 13 years, familiar with a railroad crossing at which, on account of a deep cut, a train could not be seen until one was on the track, drives upon it with his ears covered up on account of the cold, though he had just been told at the post office that the train was late, and would probably reach the crossing at about the same time he did, he is guilty of contributory negligence which will prevent recovery for his death, though the train was

running at a high rate of speed, and the whistle was not blown.¹⁸

Injuries to Passengers, Employees and Strangers.

In Virginia, a freight train with caboose for passengers, stopped at a certain station, and the conductor, though he saw several persons approaching with baggage, ordered the engineer to back the train. Without warning, the train was violently backed while the passengers were boarding it, fatally injuring a boy between five and six years old, about to get on. The Supreme Court of Appeals holds the railroad liable.¹⁹

In New York a north bound train stopped at a station, and plaintiff, a passenger, got off on the side opposite the station platform, and in attempting to cross the tracks, was struck by a southbound train and injured. There was evidence that a rule of the company requiring passengers to get off on the station side was not observed at this station, but that it was a common occurrence for them to get off on the opposite side. There was also evidence that escaping steam from the engine at the station obstructed the view of the southbound train, and that the southbound train did not stop before passing the train delivering its passengers. The Supreme Court holds the railroad liable.²⁰

In Texas the Supreme Court rules that a railroad which has provided a safe exit from its cars, while at the same time there exists another way which is not safe, and which is in such general use by its passengers as to induce the belief that it was provided in part at least for that purpose, is liable for injury received by a passenger using such unsafe exit without warning from the company's servants.²¹

In Texas the Supreme Court rules that a section foreman who has full power to employ and discharge the laborers working on his section is not their fellow servant.²²

In Minnesota a gang of sectionmen, of which plaintiff was one, was engaged in loading rails from the ground upon a flat car, when some of the men negligently let one of the rails fall upon plaintiff's arm. The Supreme Court decides that the injury was not the result of any danger peculiar to or directly connected with the use and operation of the railroad, and hence not within the provisions of the statute making railroad companies liable to an employee for injuries caused by the negligence of a co employee.²³

In Georgia it is held by the Supreme Court that an employee who to couple cars, attempts while an engine is running at the rate of four miles an hour, to jump upon a rim around the pilot which is only 1½ in. wide, is guilty of contributory negligence, and cannot recover if injured.²⁴

In Missouri the Supreme Court decides that where a brakeman is brushed from the side of a car by a car standing on the side track, too near the main track, and it appears that there was no defect in the construction of the tracks, and that the cars on the side track were placed there by another train crew, it is error to charge the jury that, if the brakeman was knocked from the car he was on, "wholly by the negligence and carelessness of the defendant, its agents and servants, in negligently leaving the car standing so close to the main track as to be dangerous, then plaintiff could recover," as leaving the car too close to the main track is the act of a fellow-servant, for which the company is not responsible.²⁵

In Texas it is held by the Supreme Court that where one of a number of laborers working under a section foreman, who is known by the foreman to be inexperienced, reports to the foreman that the wheel of a hand-car used on the section is defective, by the tire being open, and the foreman replies that such defect does not render the car dangerous to use, that statement of the foreman may be shown in evidence in an action by the laborer against the company for personal injuries caused by an accident resulting from such defective wheel, since the statement of the foreman in such case is that of the company.²⁶

In Alabama the Supreme Court rules that where a person, not an employee, rides, with the acquiescence of the superintendent, on a car which he knows is for the use of employees only, and not for passengers, he does so under a mere license, and the company is responsible for injuries sustained by him, or his death, only when caused by its wanton or intentional wrong.²⁷

In Texas the Supreme Court decides that where a passenger on arrival at his destination hurriedly left the car on the suggestion of an employee in charge of it that the train would soon start, and left a valise therein, known by the employee to contain certain valuables, which remained in the custody of the defendant's employees for several hours, after which it was returned, rifled of its contents, the company is liable, although the journey had been completed.²⁸

In Texas it is held by the Supreme Court that a passenger who, in leaving a train on a clear night, falls into an opening 17 in. wide between the car and the platform, is not necessarily guilty of contributory negligence in attempting to leave the car at that point.²⁹

Boston & Albany, quarterly, \$2 per share, payable Dec. 3.

Chicago, Rock Island & Pacific, quarterly, 1 per cent. *Connecticut River*, quarterly, 2 per cent., payable Dec. 31.

Fitchburg, semi-annual, 2 per cent.

Northern Central, semi-annual, 4 per cent., payable Jan. 15.

Oregon Railway & Navigation Co., quarterly, 1½ per cent., payable Jan. 2.

Wellsville, Coudersport & Pine Creek, 3 per cent.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Addison & Pennsylvania, annual, 49 Broadway, New York City, Jan. 11.

Albemarle & Pantego, annual, Norfolk, Va., Jan. 18.

Arkansas & Louisiana, annual, Washington, Ark., Jan. 25.

Bellaire, Zanesville & Cincinnati, annual, Woodsfield, O., Jan. 4.

Boston & Lowell, annual, Boston, Mass., Jan. 6.

Brooklyn Elevated, annual, 31 Sands street, Brooklyn, N. Y., Jan. 6.

Cleveland & Pittsburgh, annual, Cleveland, O., Jan. 6.

Columbus, Hocking Valley & Toledo, annual, Columbus, O., Jan. 12.

Kings County (Elevated), annual, 346 Fulton street, Brooklyn, N. Y., Jan. 13.

Little Schuylkill, annual, 410 Walnut street, Philadelphia, Pa., Jan. 13.

Mine Hill & Schuylkill Haven, annual, 119 South Fourth street, Philadelphia, Pa., Jan. 11.

Nesquehoning Valley, annual, 226 South Third street, Philadelphia, Pa., Jan. 11.

New York & Middle Coal Field, annual, 228 South Third street, Philadelphia, Pa., Jan. 12.

New York, Ontario & Western, annual, 18 Exchange Place, New York City, Jan. 20.

North Pennsylvania, annual, 240 South Third street, Philadelphia, Pa., Jan. 13.

Norwich & Worcester, annual, Worcester, Mass., Jan. 13.

Philadelphia & Reading, annual, 227 South Fourth street, Philadelphia, Pa., Jan. 11.

Philadelphia, Wilmington & Baltimore, annual, Wilmington, Del., Jan. 11.

Pittsburgh & Lake Erie, annual, 77 Fourth avenue, Pittsburgh, Pa., Jan. 26.

Pittsburgh, McKeesport & Youghiogheny, annual, Pittsburgh, Pa., Jan. 26.

Rome, Watertown & Ogdensburg, annual, 96 Broadway, New York City, Dec. 28.

St. Louis, Vandalia & Terre Haute, annual, Greenville, Ill., Jan. 12.

Terre Haute & Indianapolis, annual, Terre Haute, Ind., Jan. 4.

Terre Haute & Logansport, annual, Terre Haute, Ind., Jan. 4.

Toledo & Ohio Central Extension, annual, Marietta, O., Jan. 11.

Utica & Black River, annual, Grand Central Station, New York City, Dec. 28.

Western & Atlantic, annual, Atlanta, Ga., Jan. 20.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* will hold regular meetings, commencing January, 1892, on the second Monday of each alternate month, at the United States Hotel, Beach street, Boston, Mass.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings at its rooms in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturday of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

American Society of Civil Engineers.

A regular meeting was held Dec. 16, President Chanute in the chair. The paper of the evening was on

THE RED ROCK CANTILEVER BRIDGE.

by S. M. Rowe, S. W. Robinson and Henry M. Quimby.

The paper is very long (58 pp.), and was read by abstract. Even then the time was exhausted before the discussion began. Nevertheless there was a short discussion. This bridge was well described, with illustrations, in the *Railroad Gazette*, April 25, 1890.

Mr. J. F. Wallace sent a written discussion in which he dwelt especially upon the insufficiency of the borings and the costly result of "economy" in that particular. He described very briefly the borings for the Sibley bridge, which were so thorough and accurate that the deductions from them were fully verified in the subsequent work.

Mr. Macdonald spoke of the use of concrete for bridge piers. South of the regions of frost, very excellent results both in saving first cost and in durability have been got by its use. In this case money might perhaps have been saved by the use of concrete for the supporting piers as well as for the cantilever piers.

He noticed that much material had been rejected for surface defects. He has known a great deal of bridge material to be rejected for such apparent defects which, on being cut up and tested, showed first-rate qualities. Some of the plates of the Forth bridge, of high steel, broke like glass until the edges were planed off, when they no longer broke. They had been sheared, and the edges injured in the shearing. With universal plates cinders may adhere and cause apparent surface defects which are really of no importance. What we all want is commercial material and not laboratory material.

He would not take time to consider the general design, but merely suggested that lines of grace were apt to be lines of economy, and this principle is found to be wider the more we know.

Mr. Breithaupt spoke of the fact pretty generally known that a mid-river pier might have been built for about what the east cantilever pier actually cost, and the great span of 660 ft. divided with decided saving in the cost of superstructure. This was the costly mistake in the bridge and came from insufficient knowledge of the bottom of the river.

Civil Engineers' Societies of St. Paul and Minneapolis.

A joint meeting of the Civil Engineers' Society of St. Paul and the Minneapolis Engineers' Club was held at the rooms of the former society Dec. 7. Prof. W. R. Hoag, of Minneapolis, read a paper on Geodetic Leveling, explaining the instruments employed in precise leveling, their adjustment and use. He stated that a precision of 1 to 1,000,000 common in horizontal was not possible in vertical measurements. One mm. into the square root of the number of kilometres run is precise for leveling, but 5 mm. /km is hardly passable.

A portable turning point is used, the rod resting in a shallow cavity therein and held as nearly plumb as practice enables a rodman to hold it. Readings are taken to 1/10 mm. The exercises of the evening were concluded in a dining room at the Windsor.

Engineering Association of the South.

The regular December meeting of the association was held at the new headquarters in the Cumberland Publishing House, Nashville, Tenn., on the evening of Dec. 10.

Mr. Hunter McDonald, of Atlanta, Ga., Engineer in Charge of the Western & Atlantic, presided, and about 30 members and visitors were present. Applications for membership were received from Mr. William Hewitt, Engineer and Vice-President of the Trenton Iron Co., Trenton, N. J., and Mr. J. S. Walker, United States Assistant Engineer in Charge of construction of locks on the Cumberland River Improvement. The secretary presented the specifications governing the competition for the cash prize of \$1,000, offered by the Board of Public Works of Duluth, Minn., for the best plans for a drawbridge across the ship canal at that place.

Mr. Olin H. Landreth brought before the association for consideration the question of instituting under the auspices of the association a competitive trial of machinery used in highway building. After discussion by Messrs. E. C. Lewis, Hunter McDonald and W. H. Lyle, a committee was appointed to investigate and report at the next regular meeting the feasibility of instituting the competitive trial proposed. Messrs. Olin H. Landreth, W. G. Kirkpatrick and J. A. Fairleigh comprise the committee.

The paper of the evening, entitled "Refrigerating Systems," was then read by Dr. Wm. L. Dudley, of Vanderbilt University, Nashville, Tenn. The paper comprised an historical account of the development of refrigerating methods, and, after classifying the several processes under the head of "absorption" and "evaporating" systems, proceeded to develop a comparative exhibit of the chemical and mechanical results obtained by each process. The paper was illustrated by diagrams, showing the working of the different systems, as well as lithographs and photographs of modern machinery as now built.

New England Railroad Club.

At the meeting Wednesday evening, Dec. 9, 1891, President Twombly occupied the chair. He announced as the subject for discussion at the January meeting, "Locomotive Boilers and their Attachments," and the subject

¹Allen v. City of Jersey City, 22 Alt. Rep., 257.

²Allen v. City of Jersey City, 22 Alt. Rep., 257.

³J. T. & K. W. R. Co. v. Peninsula Co., 9 South Rep., 651.

⁴Cutler v. F. R. & N. Co., 46 Fed. Rep., 641.

⁵Stanton v. New York & E. Ry. Co., 22 Alt. Rep., 300.

⁶Avey v. G. H. & S. A. Ry. Co., 16 S. W. Rep., 1,015.

⁷Finch v. N. P. R. Co., 49 N. W. Rep., 329.

⁸N. & W. R. Co. v. Groschloose A., 13 S. E. Rep., 454.

⁹Shields v. N. Y. C. & H. R. R. Co., 15 N. Y. (Supp.), 613.

¹⁰Knahtia v. Oregon Short-Line & U. N. Ry. Co., 7 Pac. Rep., 9.

¹¹Mahoney v. N. Y. C. & H. R. R. Co., 15 N. Y. S., 501.

¹²H. & D. R. Co. v. George, 13 S. E. Rep., 429.

¹³Flynn v. C. R. R. of N. J., 15 N. Y. S., 328.

¹⁴Pennsylvania Co. v. Langendorff, 28 N. E. Rep., 172.

¹⁵Lane v. I. C. R. Co., 9 South Rep., 560.

¹⁶E. T. V. & G. R. Co. v. Korngay, 9 South Rep., 587.

¹⁷Merrigan v. B. & A. R. Co., 28 N. E. Rep., 149.

¹⁸Norfolk & W. R. Co. v. Stone's Adm'r, 13 S. E. Rep., 432.

¹⁹N. & W. R. Co. v. Groschloose, 13 S. E. Rep., 454.

²⁰Goldberg v. N. Y. C. & H. R. R. Co., 15 N. Y. S., Supp., 579.

²¹Gulf, C. & S. F. R. Co. v. Wells, 16 S. W. Rep., 1,025.

²²Pearson v. C. M. & St. P. Ry. Co., 49 N. W. Rep., 302.

²³Mayfield v. S. G. & N. A. R. Co., 13 S. E. Rep., 450.

²⁴Chaub v. Hannibal & St. J. R. Co., 16 S. W. Rep., 921.

²⁵Gulf, C. & S. F. R. Co. v. Wells, 16 S. W. Rep., 1,025.

²⁶McCauley v. Tennessee Coal, Iron & Railroad Co., 9 South. Rep., 611.

²⁷Bonner v. De Mendoza, 16 S. W. Rep., 976.

²⁸M. P. Ry. v. Long, 16 S. W. Rep., 1,016.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Baltimore & Ohio, semi-annual, 3 per cent. on the preferred stock.

for discussion at the present meeting. "Tools and Machinery for Railroad Men," the subject to be opened by Mr. E. E. Davis with a paper. The paper and discussion will be found on another page.

New York Railroad Club.

The annual meeting of this club was held at the rooms of the club, Nov. 19. First Vice-President R. C. Blackall in the chair. The Secretary reported a total membership of 163, and the finance committee reported a small balance of assets on hand after paying all liabilities.

The club then proceeded to the election of officers, with the following result: *President*, R. C. Blackall, Superintendent Motive Power and Machinery, Delaware & Hudson Canal Co.; *Vice-President*, George W. West, Superintendent Motive Power, New York, Ontario & Western; *Second Vice-President*, W. L. Hoffecker, Superintendent Motive Power, Central Railroad of New Jersey; *Third Vice-President*, Thomas Aldcorn, Division Master Mechanic West Shore; *Secretary*, H. G. Prout, Editor *Railroad Gazette*; *Treasurer*, C. A. Smith, Union Tank Line. *Executive Committee*: John S. Lentz, Superintendent Car Department, Lehigh Valley; W. H. Lewis, Division Master Mechanic, Delaware Lackawanna & Western; W. G. Wattson, Division Superintendent, West Shore; W. W. Snow, Ramapo Iron Works; W. C. Ennis, Master Mechanic, New York, Susquehanna & Western. *Finance Committee*: E. H. Andress, Address Paint & Color Co.; J. H. Bailey, Vice-President *Railroad Gazette*; S. W. McMunn, Coalbaugh, McMunn & Pomeroy.

The subject for the next meeting was announced as "Methods of Handling Coal, with Special Reference to Locomotive Service."

Northwestern Track & Bridge Association.

A regular meeting of the Northwestern Track & Bridge Association was held in the Union depot, St. Paul, Friday, Dec. 11. Three names were proposed for associate membership—R. C. Ramsay, August Algren and E. J. Ieff. The discussion of Mr. Rafferty's paper, continued from the last meeting, showed that nearly all the members favor the use of ties for a foundation for a right angle crossing. One plan for using timber without framing did not meet with the same objections that were made to a framework. In this plan three timbers, 10 x 12 in., 14 ft. long are used, being laid parallel with one of the tracks, the two outside timbers carrying that track, and the third timber laid between them forms the centre support for the crossing track.

Mr. B. T. McIver's paper on "Plan for Constructing a Crossing of Two Pile Bridges," was then read. The following is an abstract of it. Twenty-one piles are driven under the crossing, supporting six caps—three of them at right angles with each track. The bents are spaced 3 ft. 8 in. from centre to centre. The caps are framed together, one-half the depth of the timber being lapped from each. The caps are fastened at each intersection with one drift bolt and each cap bears upon five piles. The additional amount of piling required is 33 per cent. and of cap timbers 45 per cent. Two 8 x 14 track stringers, of such lengths as will break joints, are used under each track and framed together in the same manner as the caps. Oak ties 6 x 8 in., 12 ft. long were used on this crossing, both tracks being on 2° curves. In case of a right angle crossing, a 12-in. tie should be placed under each rail of one of the tracks, affording margin for spiking, and the space between and outside filled in with standard ties. This paper provoked a lively discussion, which was continued to the next meeting.

Mr. Buell read a short paper on "Frogs," in which he expresses a belief that two frogs should be used on all roads—one of not less than one in ten for main track, and one of one in seven or one in eight for yards. The paper refers to the many kinds of rigid frogs on the market, and states that while there is some choice, if all were made from rail containing the same amount of carbon, the life of all of them would be about the same. Mr. Buell advocates the use of the improved spring rail frog for main line use, and speaks of the experience he has had with one of the old pattern spring rail. He says it has been in use for 30 months and appears to be good for two years more of service. It was necessary to renew a rigid frog at that point every five months.

The brief discussion upheld the claims made by Mr. Buell for the improved spring rail frog. Further discussion was carried over to the March meeting, when officers will be elected for 1892.

PERSONAL.

—Mr. Frank W. Clark, General Freight and Passenger Agent of the Seaboard & Roanoke system, died at Norfolk, Va., last week after a long illness.

—Mr. A. M. Anson has resigned his position as General Northwestern Passenger Agent of the Wisconsin Central, and the position has been abolished.

—Mr. Frank M. Gilmer, Jr., who was the first President of the South and North Alabama railroad, died at Montgomery, Ala., Dec. 10. He was also one of the original organizers of the Elyton Land Co., and had been identified with many other enterprises in Montgomery for 40 years.

—Mr. E. R. Knowlton, who has 1 Division Superintendent of the Wisconsin Central at Waukesha, has been appointed Superintendent of the Chicago & Northern Pacific road, which controls the Chicago terminus of the Northern Pacific. He succeeds Mr. John T. McBride, who has resigned.

—Mr. Darius Thomas, formerly Assistant Superintendent of the New York & New England Railroad from 1866 to 1870, died in Waltham, Mass., Dec. 12, aged 64. He was traveling engineer for the Baldwin Locomotive Works for some time, and later he became the Assistant Superintendent of the Prospect Park & Coney Island road.

—Mr. Charles Atwater, who was the Treasurer of the New Haven & Derby before it was leased to the Housatonic, died in New Haven, Conn., last week, aged 76 years. Mr. Atwater had long been a prominent business man, and was President of several financial institutions and iron companies, including the Birmingham Iron & Steel Works, and the New Haven Rolling Mill.

—Mr. Walter F. Randall has removed his office from Oneida to Syracuse, N. Y., though still remaining Chief Engineer, Board of Sewer Commissioners, Oneida, N. Y. He is also Chief Engineer of the Syracuse, Eastwood Heights & De Witt electric railroad, and the Syracuse & Oneida Lake steam railroad, now under construction.

—Mr. Thomas H. Davis, Auditor of Disbursements of the Pennsylvania, died at Philadelphia, Dec. 11. Mr. Davis entered the service of the Pennsylvania in 1850 as a clerk at Harrisburg. In 1858 he was chief clerk of railroad and canal disbursements. In 1863 he was appointed

Second Assistant Auditor, and in 1872 he was made Auditor of Disbursements, which position he held until his death.

—A change in the controlling interest of the Canada Eastern road in New Brunswick has resulted in the resignation of all the general officers of the road, including the General Manager, Alexander Gibson, of Marysville, N. B.; Thomas Hoben, Superintendent and General Freight Agent; P. A. Logan, Mechanical Superintendent; James Wetmore, Treasurer and General Passenger Agent.

—Mr. William H. Schultz, of Wilmington, Del., now 87 years old, is the subject of a column sketch in the New York Sun, his experience in railroading having been exceedingly varied. He was born in Germany and came to this country 60 years ago. He was a machinist and worked as locomotive runner, master mechanic and builder of locomotives for the Philadelphia, Germantown & Norristown Railroad. He was afterward with the Norris Locomotive Works, was a runner in Prussia in 1839, in Russia between 1840 and 1852, and superintendent of the Camden & Atlantic for some years, having returned to this country in the last-named year.

—Col. William Emory Merrill, Corps of Engineers, U. S. A., and Mem. Am. Soc. C. E., died suddenly the evening of Dec. 14 on a railroad train near Edgefield, Ill. Col. Merrill was born in Wisconsin in 1835, was graduated from West Point in 1859 and served through the war as an officer of engineers. He received promotions and brevets for faithful, gallant and meritorious services at Yorktown, Pa., and the battles of Chicamauga, Missionary Ridge, Resaca and New Hope Church. He was promoted to the grade of Lieutenant-Colonel in 1883. At the time of his death he was in charge of the work on the Ohio River and its tributaries. A good many engineers whose memories go back 20 years remember his book on "Iron Truss Bridges for Railroads," which was one of the earliest attempts at a comprehensive and scientific analysis of such structures.

ELECTIONS AND APPOINTMENTS.

Atlanta & Florida.—H. Phillips has been appointed Auditor of this company, vice F. M. Ector, resigned.

Baltimore & Philadelphia.—At the ninth annual meeting held at Wilmington, Del., Dec. 15, of the stockholders, Thomas M. King was re-elected President, J. T. Odell Vice-President, and the retiring Board of Directors was re-elected.

Baltimore, Richmond & Southern.—The incorporators named in the application to the Virginia Legislature for a charter are: T. F. Miner, Richmond; C. W. Turner, Manchester, Va.; Sidney T. Dudley, Washington, D. C.; J. L. Barbour and others.

Cincinnati, Hamilton & Dayton.—R. B. Turner, for a number of years freight agent of the Michigan Central, has tendered his resignation to accept the position of Division Superintendent of the Cincinnati, Hamilton & Dayton, between Dayton and Cincinnati, O.

Cincinnati, Jackson & Mackinaw.—J. D. Williams has been appointed Chief Engineer, with headquarters at Van Wert, O., and will have full charge of maintenance of way and bridges and buildings. Mr. Williams was formerly connected with the engineering department of the Wheeling & Lake Erie railroad.

Columbus, Hocking Valley & Toledo.—M. S. Connors has been appointed Superintendent of the Hocking division of the road to succeed M. Stillwell, who resigned to accept the position of Superintendent of the Southern division of the Chicago & Eastern Illinois under General Superintendent C. H. Rockwell.

Columbia River & Astoria.—The officers of this company are: J. H. Smith, President, Portland, Or.; C. H. Page, Secretary; B. Van Dusen, Treasurer, Astoria, Or., and W. H. Kennedy, Chief Engineer, Portland.

Delaware & Otsego.—Executive officers of this road have been elected as follows: President, S. W. Andrews; Vice-President and Secretary, S. G. Dimmick; Treasurer, R. B. Jones.

East Tennessee, Virginia & Georgia.—The following directors were elected at the annual meeting in Knoxville, Dec. 16: Samuel Thomas, J. H. Inman, J. G. Moore, John Greenough, G. J. Gould, S. M. Felton, E. J. Sanford, C. S. Brice, C. M. McGhee, T. M. Logan, W. L. Bull, George Coppell, R. G. Erwin, E. P. Howell and James Schwan.

Housatonic.—At the annual meeting of the railroad, held in Bridgeport, Conn., Dec. 15, directors were elected as follows: W. H. Starbuck, J. L. Macaulay, Henry Hentz, and Thomas Rutter, New York; W. E. Downs and S. E. Merwin, New Haven; W. H. Stevenson, Bridgeport; A. B. Milford and Henry Crofut, Danbury. They later elected officers as follows: President, W. H. Starbuck; Vice-President and General Manager, W. H. Stevenson; Secretary and Treasurer, M. E. Stone.

Indianapolis Union.—The directors have elected officers as follows: W. R. McKean, President; Joseph Ramsey, Jr., Vice-President; William N. Jackson, Secretary; W. T. Cannon, Treasurer, and C. A. Vinedge, Auditor. The only change is in the Presidency, W. R. McKean, formerly Vice-President, succeeding M. E. Ingalls.

Kentucky & Indiana Bridge Co.—Charles H. Trimble, for many years connected with the Louisville & Nashville, has been appointed General Freight and Passenger Agent of this company, with headquarters at Louisville.

Louisville, Evansville & St. Louis.—Morris McDonald, Jr., has been appointed Master of Transportation of the Air Line, with office at Huntington, Ind., to succeed H. K. Kraft, resigned.

Lynchburg Belt.—At the recent annual meeting, in Lynchburg, Va., the following officers were elected: President, N. Lenig; Vice-President, A. W. Nowlin; Secretary and Treasurer, F. H. Williams. Directors: N. Lenig, A. W. Nowlin, F. H. Williams, R. T. Gleaves, J. S. Clark.

Monterey & Mexican Gulf.—C. A. Merriam has been appointed General Superintendent of the operated lines of this company, vice John Grace, resigned to take service elsewhere. His headquarters are at Monterey.

New Haven & Derby.—At the annual meeting this week directors were elected as follows: Thomas Wallace and Franklin Farrell, Ansonia, Conn.; W. H. Stevenson and A. J. Porter, Bridgeport, Conn.; S. E. Merwin, New Haven, and J. L. Macaulay, Henry Hentz, E. V. Carey

and M. E. Stone, New York. The following officers were elected: President, W. H. Stevenson; Secretary, A. J. Porter; Treasurer, C. E. Robinson.

Northern Pacific & Manitoba.—The annual meeting of the shareholders of the company was held last week in the offices of the company. These directors were elected: James McNaught, W. F. Mellen, J. W. Kendrick, J. D. Williams and Duncan McArthur.

Paducah, Tennessee & Alabama.—The annual meeting of the stockholders of the company was held in Paducah, Ky., recently, and the following Board of Directors was elected: T. H. Puryear, J. W. Phillips, Edward Cunningham, Jr.; L. C. Linn, A. B. Lamb, John L. Booth, J. J. Head, J. W. Fristoe and Charles Reed. The Directors elected the following officers: President, T. H. Puryear, Paducah; Vice-Presidents, J. W. Phillips, St. Louis, and A. B. Lamb, Paris, Tenn.; Treasurer, J. W. Harrison, St. Louis; Secretary, J. W. Fristoe, Paducah, Ky.

Parry Sound Colonization.—The following are now the officers of this company: P. McCurry, President, and J. M. Ansley, Secretary, Parry Sound, Ont.; Wm. G. Reid, General Manager, Montreal, Que.; S. R. Poulin, Chief Engineer, Emsdale, Ont.

Philadelphia & Reading.—C. F. Kindred has been appointed General Agent, with office at Fourth and Walnut streets, Philadelphia. Samuel Garwood has been appointed City Freight Agent, with office at No. 537 Chestnut street, vice J. W. McFarland, assigned to other duty. Robert S. Davis has been appointed Manager of the Atlantic City Railroad, vice Mr. Garwood, assigned to other duties. The office of Managing Director of the Atlantic City Railroad has been abolished.

Pittsburgh, Cleveland & Toledo.—The stockholders of the railroad held their annual meeting at Youngstown, O., Dec. 8, and re-elected the old board of directors, with the addition of D. B. Patton, of Pittsburgh. Gen. Orland Smith was elected President, and J. B. Washington Secretary and Treasurer.

Pittsburgh & Connellsville.—At the annual meeting in Pittsburgh last week Orland Smith, of Baltimore, was elected President, and J. B. Washington, of Pittsburgh, Secretary and Treasurer. The following directors were chosen: Orland Smith, Robert Garrett, Mendes Cohen and Findley H. Burns, Baltimore; John D. Scully, George A. Berry, W. Metcalf, W. J. Moorehead, Charles Donnelly, Pittsburgh; John W. Chalfand, Charles L. Fitzhugh, of Allegheny, and W. H. Koontz, Somerset.

Profile & Franconia Notch.—At the annual meeting at Concord, N. H., Dec. 9, these directors were elected: B. A. Kimball, J. H. Pearsons, C. A. Busiel, Walter Aiken, W. M. Parker, B. C. White, John P. George, W. F. Thayer, D. A. Gregg.

Quaker City Elevated.—The incorporators are: Thos. Briggs, Newton, Pa., President; Frank F. Bell, Bristol, Wm. B. Eltonhead, Jacob M. Peters, S. McKinlay, Edwin O. Michener, G. W. Kucker, Jackson and Samuel O. Stokes, Philadelphia, and Thomas Briggs, Newtown Square.

Rock Island & Peoria.—The annual meeting was held at Rock Island, Ill., recently, officers were elected as follows: President, R. R. Cable; Vice-President, A. Kimball; Secretary and Treasurer, H. B. Sudlow.

St. Louis, Iron Mountain & Southern.—Thomas Essex having resigned, G. A. Deane has been appointed Land Commissioner of the company, in charge of lands in Arkansas, with headquarters at Little Rock, Ark.

Sioux City & Northeastern.—The annual meeting of the company was held in Sioux City, Ia., last week. Officers were elected as follows: President, John Pierce; Vice-President, W. L. Joy; Secretary, P. Moller, and Treasurer, H. A. Johns. Directors: H. A. Johns, C. F. Haines to succeed N. Desparois, and W. F. Owen to succeed F. W. Little.

Sioux City, O'Neill & Western.—The first meeting of the organized company was held at South Sioux City, Neb., last week, and officers elected as follows: President, F. C. Hills; Secretary, J. C. Coombs, and Treasurer, A. S. Garretson. Directors: A. S. Garretson, J. C. Coombs, F. C. Hills, W. H. Goodwin, Jr.; C. L. Wright, G. W. Seever, F. A. Seaman.

Temisconata.—The shareholders, at their annual meeting last week, elected the following directors for the current year: Hon. Hector Cameron, Hon. George Irvine, and Messrs. John J. McDonald, Roger Ryan, Dr. Grandbois, Lawrence Lynch and J. I. Tarte. At a meeting of the directors, John J. McDonald, of Riviere du Loupe, P. Q., was re-elected President, and the Hon. Hector Cameron, of Toronto, Vice-President.

Terminal Railroad Association of St. Louis.—J. Q. Van Winkle, Superintendent of the St. Louis division of the Big Four, is the new Superintendent of the Terminal Railroad Association and will take charge Jan. 1.

Ulster & Delaware.—At a meeting of the directors in Rondout, N. Y., this week the following officers were elected: President, Edwin Young; Vice-President, Robert Pruyn; Secretary, Samuel Dimmick; Treasurer, T. C. Hornbeck.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

Baltimore & Ohio.—Contracts have been awarded for the grading and masonry on eight miles of the new branch line from Fairbance, Pa., south to Morgantown, W. Va., to T. H. Connell, C. D. Langthorne & Co. and Bennett & Talbot.

Bayard, Petersburg & Moorefield.—A subscription of \$25,000 has been recently voted by Grant County, W. Va., to aid this project. The road has been surveyed from Bayard via Petersburg to Moorefield, W. Va.

Black River.—The location of this line is now being completed to Claremont Junction, N. H., the eastern terminus of the line. The projected route is 28 miles long, from Proctorsville east to Claremont, and the first ten miles of this distance was surveyed during the summer and fall. Stock has been subscribed to build the road and work will be commenced soon. The line will form a new connection between the Central Vermont road and the Boston & Maine. G. A. Ayer, of Perkinsville, Vt., is Chief Engineer.

Boston & Maine.—The double tracking work has made considerable progress on the lines of this company near Boston and on the Western division during the

past year, about 22 miles of new second track being added to the system in that time. The new second track is in small sections and is distributed as follows: Between Ipswich, Mass., and Salisbury, Mass., 11½ miles; between Cliftondale, Mass., and West Lynne, Mass., four miles; Dover, N. H., to South Berwick, Me., six miles, and one mile between South Newmarket, N. H., and the junction. Fifteen miles of the new double track is in Massachusetts, and seven miles in New Hampshire. Four miles additional is under contract, Scott Tuttle being the contractor. Next year a second track will be built between Exeter, N. H., and South Newmarket, about 12 miles. This double track work, and the new branch between Fells Station and Stoneham, Mass., three miles, is the principal construction work proposed for next year.

Buctouche & Moncton.—This road, an independent line, 32 miles long, starting at Buctouche, and ending in Moncton, N. B., is in the sheriff's hands, and is advertised to be sold in Moncton, March 13 next, under several executions issued by the Supreme and County Courts. The road was finished in 1888, and was sold by the original company to the De Bertram syndicate, so called, and Louis G. De Bertram, of New York, was elected President. The scheme did not prosper, however, partly owing to the difficulty experienced in selling bonds, and the road has for some time been in deep water financially. The employees have not been paid regularly, and it is said a great deal of money is due by the company in wages.

Canadian Pacific.—The extension of the Souris branch of this road, westward from Melita, Man., is now completed to the banks of Moose Mountain Creek, and will be operated next week, when a train service will be inaugurated.

Columbia River & Astoria.—The locating survey for this line east of Astoria has just been finished. The route is along the south bank of the Columbia River, from Goble station on the Northern Pacific Railroad to Astoria, Or., near the mouth of the river, a distance of about 60 miles. It is not determined yet when contracts will be let. The work is not difficult. The maximum grade will be 60 ft. to the mile, but these are all short, never longer than about 2,000 ft., so practically for operation equivalent to a level grade. The maximum curve is eight degrees, but this is only on two sections, and on two others are seven degrees. The rest are all six degrees or under, and the only bridges contemplated are four short span draw bridges, and three or four short truss spans. Some six miles of pile trusses will be built, all low, some eight ft. in height, where material is not obtainable for banks, owing to swamps. The road is to be built by local capital, and Astoria is expected to provide a subsidy of 1,000 acres of land in city limits, and terminals on water front are already provided. The capital already subscribed is probably ample to build the road, if the subsidy is raised.

Columbus City, Birmingham & St. Louis.—Surveys are being made at present on that part of the route between Columbus City and Scottsboro, Ala., a distance of about 25 miles. The contract is reported to have been let for building this much of the line, and grading will probably begin as soon as the engineers complete the profiles. W. E. Baskette, of Chattanooga, Tenn., is President.

Cumberland Valley.—Citizens from the western part of Franklin County, Pa., and from Fulton County, visited President T. B. Kennedy this week, to urge upon him the extension of the Southern Pennsylvania Railroad, a branch of the Cumberland Valley, from Mercersburg to Foltz, Pa.

De Kalb & Red River.—This company has been chartered in Texas by P. S. Ramsaur, H. Bell, J. H. Smelser and others to build a railroad from De Kalb in a northerly direction to the Red River, a distance of 10 miles. The capital stock is \$50,000.

Denver, Lakewood & Golden.—A contract has been signed to build a branch electric road through Villa Park by April, by which time it is anticipated the road will have electric cars running between Denver and Golden.

Duluth Terminals.—President T. F. Oakes, of the Northern Pacific, has stated that the Duluth terminals will be modeled after the Indianapolis plan. The entire terminal properties of the St. Paul & Duluth and Northern Pacific will be taken at appraised values. The charges for the use of these terminals by other roads will be made sufficient to pay to these two roads six per cent. interest on the value of their properties included in the system.

Eastern Virginia & Tidewater.—This company has applied for a charter from the Virginia legislature, John Tyler, F. G. Montague, J. A. Tyler, Robert McCandish and J. F. T. Anderson, being named as incorporators. The road is to extend from Hanover County to a point on Chesapeake Bay in Matthews or Gloucester counties.

Florida Phosphate.—This railroad, of which W. H. Adams, of Ocala, Fla., is President, will, it is stated, build a railroad from Haines City to Avon Park via Midland.

Fordville, Hartford & Southwestern.—The organization of the company has progressed considerably of late, and it is expected that the surveys will begin early in February between Fordville and Hartford, Ky., and to Madisonville.

Grafton & Greenbrier.—The contractors are now laying 70-lb. rails from Monteville, W. Va., where the work was left off to continue the grading at the upper end of the line last fall. They are laying a mile of new track a week and will be through about Jan. 10. The Baltimore & Ohio officers made an inspection of the line last week and were well pleased with the work as far as it has gone.

Johnsburg & Bradford.—The contract for the grading and the masonry on this road, an extension of the Buffalo, Rochester & Pittsburgh, from Howard Junction to Mount Jewett, Pa., a distance of 20 miles, has been let to Brendlinger & Nearing, of New York. The work is to begin at once and is to be finished on or before Sept. 1. The contractors have just finished work on the Lehigh Valley, Philadelphia & Reading and Pittsburgh, Fort Wayne & Chicago. The new road avoids the Kinzua Bridge, as it runs at the head of the valley and gives easier grades.

Mankota & Northeastern.—This company has just been organized at Mankota, Minn., with a capital stock of \$1,000,000. The road will extend from Mankota, via Kasota, Cleveland, Lesueur, Centre and Montgomery to Farmington, where it will connect with the Chicago, Milwaukee & St. Paul.

Marion & Rye Valley.—S. P. Swain & Co., of New York, have applied to the Virginia Legislature for a charter for this company to build a road from Marion to ore fields leased by them, a distance of six miles, and thence into Rye Valley.

Memphis Union.—Construction work is progressing on this road at Memphis, Tenn., which is projected as a belt line for freight and passenger traffic to furnish all railroads connection with the new steel bridge across the Mississippi River, and to provide additional facilities for handling cotton. J. C. Rogers, of Memphis, is President.

Montreal & Ottawa.—The contractors, Messrs. Hendershot & Brecken, are pushing the construction of the road along the south side of the Ottawa River. They have not more than a mile to complete between Point Fortune and Rigaud, Que., and if the weather continues fine the cars will be to Point Fortune by Christmas. Mr. A. Charlebois, the general contractor, has purchased land upon which the stations are to be erected.

Morristown & Cumberland Gap.—Track is now laid between Morristown and Corryton, Ky., a distance of 44 miles. The principal stations are, Morristown, Bean Station, Rutledge and Corryton. The road will be ready to operate by Jan. 1.

New Roads.—It is proposed to build a railroad from either Asheville or Hendersonville, N. C., to Eastatoe Ford. Transylvania County proposes to aid in its construction from the Henderson County line to Eastatoe Ford by the issue of \$70,000 of bonds. W. A. Gash, of Brevard, is interested in the project.

G. I. Turnley, C. B. Martin, E. W. Robinson and others are promoters of a project to build a railroad from Cold Springs, Tex., east to the Houston, East & West Texas Railroad or the Gulf, Colorado & Santa Fe line.

M. R. Rivers, P. E. Gregory, J. S. Buist and E. H. Mickey are applying for a charter in South Carolina to build a railroad from Glover, S. C., to the Ashpepo and Edisto rivers.

R. McMillan and H. McNeill, of Red Springs, N. C., are surveying and securing right of way for a railroad from Red Springs to the Atlantic coast line.

New York, Lake Erie & Western.—It has been decided to straighten the line of the New York, Pennsylvania & Ohio through the Pine Valley, about eight miles east of Corry, Pa. There are several reverse curves through a cut of red shale rock. The curves are to be reduced to one easy one, and the grade much reduced. It will require a month to complete the work, which will cost about \$80,000.

New York, New Haven & Hartford.—During this year about 42 miles of new track has been laid on the Shore Line and New York divisions on the double and four tracking of those divisions. The additional track built on the Shore Line division is between Leete's Island and Clinton 10½ miles and between East Lyme and New London, Conn., seven miles. On the New York division between South Norwalk and Bridgeport, Conn., the company has nearly completed the four tracking for a distance of 12½ miles, or, reduced to single track, 25 miles.

Norfolk & Western.—The Kenova bridge over the Ohio River, at the northern end of the Ohio & West Virginia extension, was opened for traffic Dec. 13, and on the same day regular trains were begun running over the new extension through West Virginia to Dunlow, a new town about 50 miles southeast from Kenova. Through trains will hereafter be run from Columbus through Ironton, O., and across the new bridge to Dunlow, W. Va.

The line from Norfolk to Lambert's Point, a distance of about five miles, will soon be double tracked, and the company propose to construct at Lambert's Point larger yards and sidings and an engine house and repair shops. J. A. Garrett and Robert D. McCue, of Staunton, Va., have the contract to grade part of the branch road, to be built to the mines of the Virginia Mining & Investment Co., near Vesuvius, Va.

Norfolk, Wilmington & Charleston.—This company which proposes to build a road from Norfolk via Wilmington, N. C., to Charleston, S. C., has applied to the South Carolina legislature for a charter. The company has obtained a charter in North Carolina, and has about completed the survey between Norfolk, Va., and the South Carolina line. The office of the company is at 212 South Third street, Philadelphia.

Northern Central.—The survey by the Pennsylvania Railroad of a route from Green Spring Valley to Westminster, Md., which has been interrupted, will soon be resumed and completed.

Nova Scotia.—Steps are being taken to secure charters from the Dominion parliament for two railroads in Nova Scotia. The first of these is intended to connect Orangedale with Baddeck, touching on the Broad Cove mines, and the other is to extend from the Richmond coal mines to Louisburg. The first would cover a distance of 35 miles, the second 78 miles. Three provincial charters have been granted for the construction of a railroad over the first of these proposed routes, and as for the second of them, it was rejected by the government engineers for the route of the present Cape Breton system. During the last five sessions attempts have been made, but without success, to have these two bills passed by Parliament. The first passed the House last session but was defeated in the Senate.

Orangeburg.—Application has been made to the South Carolina legislature for a charter for this company, which proposes to build a line connecting with the Charleston, Sumter & Northern Railroad and the South Bound Railroad from a point about 38 miles from Orangeburg, through that town and south about 13 miles. S. Bibble is one of the incorporators.

Parry Sound Colonization.—This line is to extend from Scotia Junction near Emsdale, Ont., on the Northern & Pacific Junction road (operated by the Grand Trunk) westward to the town of Parry Sound, Ont., on the Georgian Bay, a distance of about 48 miles. The whole line has been surveyed and is under contract. About 20 miles of track has been laid. The work is comparatively easy. The maximum grade is 52 ft. to the mile. It is expected that this road will in conjunction with the Ottawa & Parry Sound Railroad (now being surveyed from Ottawa to the junction at Scotia) form part of a short through line from Georgian Bay to the Atlantic seaboard via Ottawa and Montreal by the Canada Atlantic, or via Ottawa and Boston by the Canada Atlantic and Central Vermont connections, which will be the shortest route between the Upper Lakes and Europe for grain and other traffic. The saving in distance between Port Arthur and Duluth by this new route to say Liverpool,

England, will be about 800 miles of land and water carriage. Parry Sound on the Georgian Bay has one of the finest harbors on the Canadian side of the lakes, with a minimum natural depth of 30 ft. of water.

Paso Robles & Cayucos.—Articles of incorporation were filed in California last week by this company. The capital stock is \$700,000. It is proposed to build a railroad from Paso Robles to Cayucos, about 30 miles. The directors are George R. Adams, H. Eppinger, E. A. Stowell and O. C. Bryant, of Paso Robles; M. M. O'Shaughnessy and J. N. E. Wilson, of San Francisco; A. F. Jack, of San Luis Obispo, and J. W. Watson and A. M. Hardie, of Cayucos, Cal.

Pittsburgh, Chartiers & Youghiogheny.—The Pennsylvania Co. has secured control of this road, a line only 16½ miles long, but which extends to rich coal lands near Pittsburgh. The road runs from Beechmont to Chartiers, and will be connected with the Pennsylvania lines by the Ohio Connecting bridge. The capital stock is \$593,000.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The second track of the main line has just been extended from Mingo Junction, O., to Fernwood, O., a distance of 6.7 miles. The work was done by the railroad company's own forces and is now completed and in operation.

Pittsburgh & Lake Erie.—A committee of the Washington, Pa., Chamber of Commerce has urged the officers of this road to build a branch from Bridgeville, a point on a coal extension of that road, to Washington, a distance of 18 miles.

Pittsburgh, Ohio Valley & Cincinnati.—The line is graded almost all the way to Marietta, O., and the ties are laid nearly all the way. Rails have been laid and bridges completed from Bellaire to Pipe Creek, five miles above Powhatan Point. The work is necessarily slow, as all the materials have to be hauled by team. With favorable weather Powhatan Point will be reached by Feb. 1, and from that point down work will be much more rapid.

Port Reading.—The Philadelphia & Reading Railroad is rapidly pushing the work of laying the track from the main line of the Central of New Jersey, near Cranford, N. J., to Port Reading, its new terminus on Staten Island Sound, near Seawarren, for the shipment and storage of coal. The trestlework, docks and dredging are now nearly completed. This new tidewater delivery of coal will relieve the traffic over the Central Road from Cranford to Communipaw.

Quaker City Elevated.—A state charter was granted to this company this week at Harrisburg, Pa., to build a road, about 12 miles long, from the intersection of Front and Market streets in Philadelphia to a point at or near the intersection of Ridge avenue and Lehigh avenue, with a branch extending from a point near Cobb's Creek in Delaware County. The President is Thomas Briggs, of Newtown, Pa.

Richmond, Nicholasville, Irvine & Beattyville.—The bondholders of the railroad will ask the court to authorize the issue of receiver's certificates to the amount of about \$150,000, to be used, in addition to the \$350,000 of county subscriptions, in completing the road from Irvine to Beattyville, Ky. The distance is 39 miles, about half of which is graded. Mallory, Cushing & Co., of Omaha, Neb., have the contract for the work.

Roanoke, Fincastle & Clifton Forge.—The charter of this company will probably be amended at this session of the Virginia Legislature, and the route changed so that the road may extend from Roanoke City through the counties of Roanoke, Botetourt and Alleghany to Clifton Forge, or some point upon the Chesapeake & Ohio road near that town.

St. Louis & Superior Terminal.—About three miles of this road has been graded from Walbridge, Minn., on the Northern Pacific and is ready for the tracklaying, which has not yet begun. Cooper & Davis, of Duluth, are the contractors for building this line, and in addition to the above section are constructing seven miles of road between New St. Louis, on the St. Louis River, and West Superior. The road is projected to be a belt line around the cities of Duluth and Superior.

San Francisco & Eastern.—This company was chartered in California this week to build a road from Alameda Bay, opposite San Francisco, south through Hanford and Tejon Pass to Rogers, Kern County, 380 miles. Also from Hanford, through Walker's Pass, to Indian Mills in Kern County, 100 miles. The incorporators are: C. W. McAfee, W. W. Belvin, H. J. Brady and C. L. Welle.

Savannah, Jacksonville & Gulf.—This company has applied for a charter in Florida to build a road between Savannah, Ga., and Tampa, Fla., a distance of about 320 miles. The capital stock is \$3,000,000, and has been partly subscribed by a foreign syndicate interested in phosphate mining. The line is projected through the counties of Nassau, Duval, Clay, Putnam, Marion, Sumter, Citrus, Hernando, Pasco and Hillsborough in Florida. The directors are Gustave Thurlthill, of Ocala, Fla.; Samuel R. Pyles, of Atlanta; John G. Bishop, of Clear Water Harbor, and Herbert A. Bishop, of Jacksonville.

Sidney & Southern.—This company has been organized in Washington for the construction of a railroad from Sidney south to Portland. The new road is to pass through Kitsap, Mason, Chehalis, Lewis, Cowlitz and Clark counties, and will cross the Willamette near East Portland, the headquarters of the new company. The route of the new road passes through fine timber country, while in Mason County it runs near the recently discovered hematite iron mines.

South Bound.—At a meeting of the stockholders in Savannah, Ga., Dec. 8, it was decided to increase the capital stock by \$200,000, making it \$1,000,000. The small floating debt will be liquidated and the balance will be used in building the road into Savannah and Columbia, S. C., and establishing terminals at these places.

South Carolina Roads.—Bills have been introduced in the State Legislature chartering the Hampton & Branchville Railroad & Lumber Co.

Southern Pacific.—Work on the cut-off line from San Bruno, south of San Francisco, along the Alameda Bay shore is being pushed rapidly. There will be four tracks—two for freight and two for passenger service. There will be one tunnel 1,050 ft. long.

South Florida.—Morgan, Reynolds & Walker, of Pemberton Ferry, Fla., who have the contract for building the extension north of that town, have a considera-

ble force still at work, but the progress is slow. About 40 miles of the extension from Pemberton Ferry north to Dunnellen, Fla., may be said to be under construction, but hardly any of this distance will be completed this year. The seven mile branch to the phosphate mines at Phosphoria, Fla., will probably be completed before Jan. 1.

Springfield, Yellville & White River.—This company was incorporated in Arkansas this week, with a capital of \$2,500,000, to build a road from a point on the Missouri line in Boone, southwest through Arkansas to the Mississippi River, ending at a point in Crittenden County, Ark. The promoters are Kansas City capitalists.

Syracuse & Oneida Lake.—This company has been recently organized at Syracuse, N. Y., and proposes to build a road from a point near South Bay on Oneida Lake, to Messina Springs, a distance of 10 miles. From Messina Springs to the city of Syracuse an electric line will be built, the Syracuse, Eastwood Heights & De Witt railroad, Nelson L. Williams, of Syracuse, is President and Walter F. Randall, of Syracuse, is Chief Engineer.

Tintic Range.—The heavy work in the Homansville cañon between Goshen and Eureka, Utah, on this road is now complete and trains are advertised to run into Eureka, the terminus of this road, this week. The track, however, is not yet laid, and right of way to the east of town is in dispute.

Virginia Road.—A bill has been introduced in the Virginia Legislature extending the time for completing the Radford & Little River road.

Wabash.—The company still has large forces of men at work on the heavy cuts and fills from North Manchester to Detroit, of the new Chicago and Detroit line, and will probably complete them this winter, leaving practically only the light grading, the bridging and ironing to be done next summer. When completed this line will be 17 miles shorter than the Michigan Central. The company expects to have the track laid in 9 months.

Wheeling & Connellsville.—This company, which was incorporated in West Virginia a few months ago by local manufacturers of iron and steel, and who are large consumers of coke, has completed its organization, and the surveys have been begun between Connellsville, Pa., and Wheeling, W. Va., the proposed termini. Mr. Job Abbott, of New York City, Chief Engineer of the Wheeling Bridge Terminal Railway Co., in Wheeling, is Chief Engineer of the new road. On last Monday an engineering party, under Mr. Gilmore Brown, who was Assistant Engineer of the Wheeling Terminal Co., started from Wheeling to make the surveys for the line. Within the past 15 years several routes for a part of the distance have been surveyed but none of them has ever been built upon. Of these routes four have been given practical consideration, and found suitable for a line in the general direction of the Wheeling and Connellsville road. Two of them unite at Waynesburg, Pa., three crossing the Monongahela River at points separated by 20 miles. The most northerly of these routes is known as the old South Pennsylvania survey. It started from Wheeling, and extended up Middle Wheeling Creek, crossed over by Prosperity and Van Buren to the headwaters of Ten Mile Creek, left this stream near Zollarsville, and went over to Bealsville, and crossed the Monongahela at California, and thence to New Haven across from Connellsville. The other three routes all began in the valley of Big Wheeling Creek. The northernmost ran up to Enslow's Fork, crossed the divide to Brown's Fork of Ten Mile, and thence extended to Waynesburg, Pa. The middle route ran up the South Fork of Wheeling Creek, cut across by Jacksonsville to Gray's Fork of Ten Mile, and also went to Waynesburg, thence to the Monongahela River, and to Uniontown, Pa. The southern route is via Ryerson's station through Monongalia County, W. Va., to Dents P. O., and to Lock No. 8 on the Monongahela River, and to Uniontown. Almost any one of these lines beyond Waynesburg would give a good route, but the principal idea in sending out the engineers is to get a better line from Wheeling to Waynesburg, if possible, than any of them. Any line up Wheeling Creek from Elm Grove to the Pennsylvania State line would be almost a line of bridges, for the creek is very crooked. After that point is passed the route is not so bad, and one or two tunnels will carry it through the Green County divide. The distance over which the entirely new survey will be made is about 70 miles in length, and Mr. Brown thinks the permanent line can be run by May 1. The incorporators are anxious to have the construction begin early next summer, which is the reason for starting the survey in mid-winter.

Wilmington, Chadbourne & Conway.—This road is reported to have come under the control of the Atlantic Coast Line, with which it connects at Chadbourne, N. C. The line is about 30 miles long, extending from Chadbourne, a point west of Wilmington, south to Conway, with a short branch to lumber mills. A branch is being built north from Chadbourne to Lumberton.

GENERAL RAILROAD NEWS.

Allegheny Valley.—This road was sold by the United States Court at Pittsburgh, Dec. 15, to P. A. B. Widener, of Philadelphia, representing the income bondholders and the Pennsylvania Railroad, for \$3,000,000, the purchaser assuming the debt of \$26,000,000. As soon as the sale has been confirmed the company will be reorganized. The plan proposed will be to increase the capital stock from \$3,000,000 to \$30,000,000, and issue bonds for \$20,000,000 to secure the company's indebtedness, virtually making the capitalization \$50,000,000.

Central New England & Western.—The application for a receiver of the railroad, a part of the Poughkeepsie Bridge system, was denied in New York this week. This application was made by owners of a small amount of the \$2,500,000 mortgage, and was opposed by the company and by the representatives of the large majority of bondholders, holding some \$2,250,000 bonds, who have agreed to extend the time for payment of the interest now overdue.

Central Vermont.—The stockholders at the recent annual meeting voted to approve the issue of a \$20,000,000 blanket mortgage at four per cent., the bonds to run a long time. About \$15,000,000 of the mortgage will be used to meet outstanding obligations as they mature, and pay the obligations of the company, which are less than \$1,000,000. The balance of the mortgage it is expected, will be used for equipment and improvements.

Chicago Elevated Terminal.—The Atchison, Topeka & Santa Fe has sold to this company real estate in Chi-

cago, part of its terminal land, for \$8,000,000. Besides the Atchison, three other railroads have agreed to use the terminals to be built by the new company in Chicago. It is proposed to issue \$50,000,000 of bonds, but they will probably not have the guarantee of the railroads using the new terminal. One of the officers of the Atchison says that at present it costs the road \$700,000 per annum, in fixed charges alone, for the utilization of the terminal property which it owns in Chicago. Under the new system there will be a saving of \$400,000 in fixed charges, besides a reduction of operating expenses.

Chicago & Northern Pacific.—The Northern Pacific has sold \$6,000,000 of this company's five per cent. bonds to a syndicate which includes Kuhn, Loeb & Co., Speyer & Co., the Deutsche Bank, of Berlin, C. B. Wright and Colgate Hoyt. The price paid is said to have been 78, with interest. A bonus of 25 per cent. in the common stock of the company was included in the sale of the bonds.

Cleveland & Pittsburgh.—The mortgage given by the railroad to the Farmers' Loan & Trust Co., of New York, for \$10,000,000 has been filed this week at Cleveland and Pittsburgh. The stockholders on Nov. 18 last authorized the issuing of \$10,000,000 in 4½ per cent. bonds to pay the debt of the road and to further equip and construct it. The present indebtedness of the company is \$6,364,000, of which \$1,105,000 in bonds falls due on Jan. 1, 1892, on a mortgage given to James F. Clark on Jan. 1, 1861, to secure bonds amounting to \$1,200,000.

East Tennessee, Virginia & Georgia.—The sale of \$1,000,000 new five per cent. equipment bonds to a syndicate was effected this week, being the balance of the authorized issue of \$6,000,000. The \$1,000,000 was sold to Maitland, Phelps & Co., and was made up of \$500,000 held in the treasury and \$500,000 new bonds to be issued.

Florida Southern.—This road will be sold in foreclosure proceedings at Jacksonville, Fla., March 7, in the interest of the bondholders. The order of foreclosure was made in the suits of the New England Trust Co., the trustee for a mortgage for \$2,156,800, six per cent. bonds, and of the American Loan & Trust Co., trustee for bonds amounting to \$809,900.

Milwaukee, Lake Shore & Western.—The negotiations which have been under way for many months for the absorption of the Milwaukee, Lake Shore & Western by the Chicago & Northwestern were closed this week, the control of the property being purchased by the Northwestern. An issue of 77,000 shares of new common stock was authorized by the Northwestern directors, to be exchanged for Milwaukee, Lake Shore & Western stock on the basis of ten shares of Northwestern for nine shares of Milwaukee, Lake Shore & Western preferred, and four shares of Northwestern for five shares of Milwaukee, Lake Shore & Western common. The exchange will involve the issue of over \$7,600,000 in Northwestern common stock. The new acquisition of the Northwestern comprises a line of road from Milwaukee, on Lake Michigan, to Ashland, on Lake Superior, with extensions and numerous branches that make the total mileage 661 miles, exclusive of 64 miles of leased roads. The road reaches the Gogebic iron range.

Ohio Valley.—This road has leased, says a press dispatch, the Clarksville & Princeton branch of the Louisville & Nashville, between Princeton and Cherry Station, Tenn., for 99 years, at \$40,000 a year. The contract for the extension of the road from Princeton to Hopkinsville will be carried out by the building of a six-mile branch from Hopkinsville to Gracey.

Providence, Warren & Bristol.—The lease of this road has been recently transferred to the Old Colony. The leased road, 15 miles long, has for years been operated by the Boston & Providence road, and the lease of the latter to the Old Colony naturally brings about the formal transfer of leased lines. The lease is for 99 years, and is in conformity with recent Rhode Island legislation.

St. Louis, Collinsville & Carondelet Belt.—The company last week filed in the office of the Secretary of State, at Springfield, Ill., a resolution adopted by the stockholders authorizing the issuance of mortgage bonds to the amount of \$1,500,000, the proceeds of which are to be used in completing and equipping the road. The bonds are to run 40 years and bear five per cent. interest.

Vermont & Canada.—A meeting of the stockholders of the company was held this week to take action on the consolidation of the road with the Central Vermont system. The stockholders ratified the plan of consolidation which had previously been adopted by the Central Vermont, the Consolidated Railroad Co. of Vermont and the Montpelier & White River Railroad. This finally effects the consolidation of the roads named with the Central Vermont.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Dec. 16, 1891.

The Commissioners of the Western Traffic Association are in session this week considering a large number of cases that have been appealed to them from the various associations. To-morrow they will give a further hearing to lines interested in the question of alleged payment of excessive commissions on trans-continental immigrant business.

A meeting of general passenger agents of Eastern roads was held Dec. 10 to discuss the advisability of withdrawing all second class tickets in Central Traffic Association territory. Owing to the absence of some of the members no decisive action was taken, and the meeting adjourned to meet again in January. The general sentiment, however, was in favor of withdrawing the tickets in question.

The Central Traffic lines have adopted a new form of certificate for reduced-rate tickets.

The Commissioners of the Western Traffic Association have issued an order changing to Jan. 1 the time when all lines will be required to enforce the agreement restricting the payment of commissions on westbound immigrant business to \$3 west of Chicago and St. Louis and \$2 west of the Missouri River. In their order the Commissioners state that the action is taken because the Southern Pacific has advised them that under the relief granted Oct. 22 that company has made engagements extending until Jan. 1. The Commissioners held, however, that the making of such engagements was not justified.

Rumors are current that the Chicago & Grand Trunk will recede from its position, and that the absorption of drayage and switching charges will soon be again discontinued.

Traffic Notes.

During the month of November the number of carloads of grain delivered at Tacoma, Wash., by the Northern Pacific was 1,196.

J. C. Rogers, agent of the Nickel Plate Line at Memphis, Tenn., has been indicted for trial before the United States Court for underbidding cotton from Memphis to Lowell.

The Brooklyn Elevated Railroad has begun to run trains from the East River to East New York every half hour between 1 and 5 a. m. Heretofore no trains have been run during these hours.

The Canadian Prime Minister, Mr. Abbott, states that it is not the intention of the government to give a rebate on Western grain transhipped at Ogdensburg. The present position of the Government on the question is a settled policy.

The through sleeping car to be put on between New York and San Francisco over the New York Central and connecting lines, is to run once a week. A Chicago dispatch states that the Pennsylvania will put its California sleepers on a regular weekly schedule, to compete with the New York Central.

The case of the Inter-State Commerce Commission against the Baltimore & Ohio, involving the legality of one-way party rates, has been advanced for hearing in Washington by the United States Supreme Court and assigned for argument the second Monday in January after a long list of cases previously assigned.

A press dispatch states that the Attorney-General of the United States has decided to bring suit against some New England railroad for violating the Interstate Commerce law in issuing passes. Senator Chandler, of New Hampshire, has complained of the Boston & Maine on this ground and that road will probably be the one complained of.

Representatives of the passenger and baggage transfer companies of various cities west of the Mississippi met in Portland, Or., recently and formed an organization to be called the Western Transfer Association. The President is C. A. Hughes, of Portland, and the Secretary P. F. Struckman, of Spokane. It appears that the Pacific Transfer Co., of San Francisco, was not represented at the meeting.

The Pandora's box in the custody of the Texas Railroad Commissioners has once more "busted" open and this time it is cotton that flies out. Complaint has been made that the cotton compressed at many compresses is below the density of what is recognized as a standard bale of compressed cotton, to wit: 22½ lbs. cotton to the cubic foot, and that the railroads, not being authorized to determine when cotton is properly compressed, ought to accept for shipment without question all cotton run through a compress, at the rate on compressed cotton. In some instances cotton compressed at interior presses has been rejected by ships at Galveston on account of indifferent compressing. The Commissioners propose to issue an order prescribing a standard of density to which its tariff shall apply, and have asked for information.

The press dispatches referring to the recent transportation of British marines between Halifax and Vancouver over the Canadian Pacific state that "time was afforded for the men to exercise twice a day." Here is a suggestion for all roads running through cars over long routes. The shortening of schedules has been carried to such an extreme that the English tourist who has to get out upon the station platform to stretch his legs every few hours is often put in dire straits. The Yankee does not so fully appreciate the need, but he ought to, nevertheless; and if he is going to continue the time saving process with through trains he should invent some mechanical agitating appliance, to use on the cars, as a substitute for the sensible though slow expedient of the Canadians.

The practicability of discontinuing traffic relations with railroads that decline to enforce the joint committee's resolution prohibiting the payment of commissions on passenger business, was discussed this week by the Trunk Line Passenger Committee and the General Passenger Agents of the roads interested, but no conclusions were reached, so far as can be learned. The sentiment of the meeting was decidedly in favor of the non-payment of passenger commissions, but it was not so decidedly in favor of breaking off relations with roads that decline to stop paying commissions. A resolution recommending to the Joint Committee that it relieve the Special Committee (Messrs. Goddard, Farmer, Blanchard and Donald) from the task of enforcing the non-commission agreement upon outside roads, received a majority of votes but not the two-thirds necessary to adopt it. The committee has asked that measures be taken to strengthen its hands in the enforcement of the non-commission agreement, or else that it be relieved from further responsibility in the matter. The Delaware & Hudson Canal Co. seems to be the only road besides the Erie that has officially notified the Chicago & Alton that it will resume traffic relations with it.

Eastbound Shipments.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Dec. 12 amounted to 98,949 tons, against 93,975 tons during the preceding week, an increase of 4,974 tons, and against 80,706 tons during the corresponding week of 1890, an increase of 18,153 tons. The proportions carried by each road were:

	Wk. to Dec. 12.		Wk. to Dec. 5.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	13,371	13.7	10,050	10.7
Wabash.....	5,750	5.8	6,580	5.9
Lake Shore & Michigan South.....	13,375	13.5	13,631	14.5
Pitts., Ft. Wayne & Chicago.....	12,964	13.1	11,236	12.0
Pitts., Cin., Chicago & St. L.....	8,601	8.8	7,346	8.4
Baltimore & Ohio.....	6,231	6.3	6,890	6.3
Chicago & Grand Trunk.....	15,742	15.9	19,503	20.8
New York, Chic. & St. Louis.....	10,326	10.5	8,837	9.4
Chicago & Erie.....	12,280	12.4	11,291	12.0
Total.....	98,949	100.0	93,975	100.0

Of the above shipments 6,668 tons were flour, 52,509 tons grain, 2,574 tons millstuff, 7,406 tons cured meats, 9,511 tons dressed beef, 1,972 tons hides and 3,953 tons lumber. The three Vanderbilt lines carried 37.7 per cent. of all the business, and the two Pennsylvania lines 21.9 per cent.

The lake lines carried 37,008 tons, against 30,983 tons during the preceding week, a decrease of 2,975 tons.